**2008 Homeland Security S&T Stakeholders Conference West**

**"Putting First Responders First"**
**Los Angeles, CA**

**14-16 January 2008**

**Agenda**

**Plenary Session Day 1**

Secure Against Fires & Embers (SAFE), Christopher Doyle Director Infrastructure Geophysical Division Science and Technology Directorate Department of Homeland Security

**Plenary Session Day 2**

**The DHS Science & Technology Directorate,** The Honorable Jay M. Cohen, Under Secretary, Science and Technology, DHS

- Aluminum Unreinforced Windows Media Audio Video File
- Hardened Aircraft Liner Windows Media Audio Video File
- HULD (Hardened Unit Load Device) Windows Media Audio Video File
- Standard Aircraft No Liner Windows Media Audio Video File

**S&T Directorate Division Heads Panel**
Mr. Jim Tuttle, Explosives Division
Dr. Beth George, Chemical & Biological Division (Acting)
Dr. David Boyd, Command, Control & Interoperability Division
CAPT David Newton, USCG, Borders & Maritime Security Division (Acting)
Dr. Sharla Rausch, Human Factors Division
Mr. Christopher Doyle, Infrastructure & Geophysical Division

**T&E and Standards**
Mr. George Ryan, Director, Test & Evaluation and Standards, S&T Directorate, DHS

**S&T Portfolio Directors Panel**
Mr. Robert Hooks, Director of Transition
Dr. Roger McGinnis, Director of Innovation / HSARPA
Dr. Starnes Walker, Director of Research

**Basic Research to Enable a Safer Nation**
Mr. Bryan Roberts, Program Manager and Economist, University Programs, S&T Directorate, DHS
Mr. James Johnson, Director, Office of National Laboratories, S&T Directorate, DHS

Los Angeles Regional Common Operational Picture Program (LARCOPP)

**Plenary Session Day 3**

**International Perspectives on S&T Research for Homeland Security**

Sweden:
Mr. Ivar Rönnbäck, Deputy Director-General, Swedish Rescue Services Agency
NATO Scenario Windows Media player Video clip
United Kingdom:
Mr. Richard Earland, Chief Information Officer, National Police Improvement Agency, United Kingdom

**Interagency Partnerships in S&T Research for Homeland Security**
**Panelists:**

- CAPT Paul Wiedenhoeft, USCG, Sector Commander/Captain of the Port, U.S. Coast Guard Sector Los Angeles - Long Beach
- Mr. Mark Denari, Director, Aviation Security & Public Safety, San Diego County Regional Airport Authority
- Mr. Daniel Hartwig, Manager of Security Programs, Bay Area Rapid Transit (BART), San Francisco

**Pre Conference Training Workshop**
**Monday, 14 January 2008**

**Training Session 3:***Better Security via Randomization: A Game Theoretic Approach and its Operationalization at the Los Angeles International Airport*
Dr. Milind Tambe Professor of Computer Science, USC

**Training Session 4:** *Risk Communications and Public Warnings:Briefout from the July workshop*
**Moderator:**
Dennis Mileti

**Training Session 5:** *Scholars in Homeland Security*

Mr. Will McCormick

**Training Session 7:** *ALLHAZ Providing a Common Operating Picture for Emergency Management*
Elizabeth J. Matlack, Director National Center for Biodefense Communications

**Training Session 8:** *Small and Disadvantaged Business Opportunities*
Ms. Phyllis Miriashtiani, Small Business Advocate Office of Small and Disadvantaged Business Utilization Office of Procurement Operations, DHS

**Training Session 9:** *Things to Remember when Doing Business in (h)omeland (s)ecurity*
Mr. David Olive, Olive Edwards & Cooper, LLC
Mr. Rich Cooper, Olive, Edwards & Cooper, LLC
David McWhorter, Olive, Edwards & Cooper, LLC

**Training Session 10:** Interoperability Training: An Introduction to Specific Tools for Communications Interoperability Improvement
Luke Klein-Berndt, CTO, CCI, DHS S&T (confirmed)

**Training Session 15:** ***Current Science & Technology Business Opportunities***
Ms. Wanda Armwood,, Associate Director Office of Procurement Operations,
Office of Procurement Operations

**Training Session 16:** *What the Homeland Security Institute is and does*
Grants to Fund Your Homeland Security Projects, Michael Paddock, CEO, Grants Office LLC

**Training Session 17:** *Federated Simulation Based Training, Exercise, and Lessons Learned*
Jalal Mapar, Program Manager, IGD, DHS S&T

**Training Session 18:** *Crisis Communication 3 State Model Systems & Gaps*
Mr. Chris Logan, National, Governors Association, Program, Director for Homeland Security

**Training Session 19**: *Explosive Detection Technology: What Do First Responders Really Want?*
Part 1
Dr. Susan Hallowell, Director, TSL

- Plume.avi windows media player (video clip)
- 10% Back Windows media player (video clip)
- SimultaneousITMS Windows media player (mpeg movie file)
- ITI_A Windows media player (mpeg movie file)

Detection Technologies Primer, David Hernandez, Transportation Security Laboratory, S&T Directorate, US Department of Homeland Security

**Training Session 21**: *Workforce Development at the Frontier of DHS: Relevant Science, Technology, Engineering and Mathematics*
**Moderator**: Tom Kowalczyk, Office of University programs, DHS S&T

- **Panelists:**
- Dr. Mike Zyda, Director of GamePipe Lab USC (ppt)
- Dr. Isaac Maya, Research Director CREATE, USC
- Mr. Adam Jascoff, NIST, Dept. of Commerce
- Ms. Cindy Randall, FIRST (For Inspiration and Recognition of Science and Technology)

Universal Detection Technology “Using the TS-10-5 Biothreat Detection Kit”
Components of Lateral Flow

**Training Session 22**: *10 Reasons Why You Should Partner with DHS S&T*
Dr. Tom Cellucci, Chief Commercialization Officer DHS S&T Directorate

**Training Session 28**: *SBIR Tutorial*
Ms. Lisa Sobolewski, DHS S&T

**Training Session 29:** *Next Generation Tech Transfer: Incubation, Rapid Prototyping, Tech Scouting*

Mr. Roger London
Next Generation Technology Transfer, Kelsey Kohler, Executive Director, Watervliet Innovation Center

**Training Session 30:** *The Future of Wireless and First Responders*
Mr. Juan Deaton, Critical Infrastructure Protection Idaho National Laboratory

**Training Session 32:** *National Trends in Homeland Security Education*
Mr. Eric Frost, Co-Director, Homeland Security Master's Program, San Diego State University
Dr. Stanley Supinski, Director of Partnership Programs Naval Postgraduate School
Dr. Tracy DeWitt, Professor University of Arkansas
Dr. Hilda Blanco, University of Washington

**Training Session 37**: *Preparing First Responders for Food Systems Disasters*
Jerry Gillespie, DVM, PhD Director, Western Institute for Food Safety and Security

**Training Session 39:** *Technology Adoption & Innovation 1*
Dr. Neal Thornberry, Innovation Chair Graduate School of Business and Public Policy, Naval Postgraduate School

**Training Session 41**: *TechSolutions: Solutions for First Responders*
Greg Price, Director, TechSolutions DHS S&T

**Training Session 42**: *The SAFETY Act*
Ms. Sylvia Cabrera, Office of SAFETY Act Implementation, S&T Directorate, DHS

**Training Session 44:** *GIS Response to the 2007 San Diego Wildfires*
Paul Hardwick, GIS Project Manager, Center for Homeland Security, SDSU Research Foundation

**Training Session 45:** *Science As Diplomacy*
Panelists:

- Dr. Mayya Tokman, Professor of Applied Mathematics, University of California Merced
- Mr. Andy Perkins, Science & Innovation Officer British Consulate-General Los Angeles, CA
- Diplomatic Expert Elicitation for Intelligence, Strategy and Scientific Technology Threat, Terry O'Sullivan, PhD, Center for Risk and Economic Analysis of Terrorism Events (CREATE), University of Southern California

**Training Session 48:** *How Real-Time Video Distribution Changes Homeland Security Mission Profiles*

**Tuesday, 15 January 2008**
**Science & Technology Breakout Sessions**

**Breakout 1:** *TechSolutions: Solutions for First Responders*
Mr. Greg Price, Director, TechSolutions

**Breakout Session 2:** *Who you gonna call?*
**Panelists:**

- Colonel Daniel Nelan
- Major General Raymond F. Rees
- Lieutenant Colonel Jeff Smiley

Homeland Security Institute Overview

**Breakout 3:** *Advanced Technologies for First Responders and Incident Management Teams*
Jalal Mapar, Program Manager DHS S&T

**Breakout 5:** *Use of Modeling & Simulation for California's Golden Guardian Exercise 07*
Michael Mercer, Associate Program Manager Systems Solutions Group, Lawrence Livermore National, Laboratory

**Breakout 6:** *Innovation at the Edge - Accelerating University and National Lab Research to First/Early Responders*
**Panelists:**

- Dr. William Pottenger, Research Professor, Rutgers University
- Ms. Carol Maresca, Deputy Superintendent of Police/Deputy Director, Public Safety Department,
- NY&NJ Port Authority

**Breakout 7:** *Managing the cultural change when a common operational picture platform is implemented*
Mr. Wayne Tolosa, President and CEO, Future Concepts I.S., Inc.

**Breakout 8 :** *FirstResponder.gov*
Sonja Rodriguez Director Tech Clearinghouse Science and Technology Directorate
Sonja Rodriguez Director Tech Clearinghouse Science and Technology Directorate

**Breakout 9:** *Critical Infrastructure Inspection Management System Working in Maryland*
**Moderator:**

- Herb Engle, Program Manager, DHS S&T

**Breakout 12:** *Northwest Regional Technology Center for Homeland Security: A Model for Connecting State and Local Needs and DHS S&T's Research*

**Wednesday, 16 January 2008**
**Science & Technology Breakout Sessions**

**Breakout 15:** Chemical and Biological Division A
Anne Hultgren, PhD, Program Manager Chem Bio R&D BBranch

**Breakout 16**: *Borders and Maritime Security Division*
Fiscal Year 2008, Borders & Maritime Security Division, Science and Technology Directorate

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- Chopper Footage Windows Media player mpeg movie file
- Coalition Warrior Interoperability Windows Media player mpeg movie file
- Future Weapons Windows Media player mpeg movie file
- Track and Events Aug 21 Windows Media player mpeg movie file
- Boat Trap Windows Media player mpeg movie file
- BT COMMS Windows Media player mpeg movie file

**Breakout 17:** *Explosives Division A Explosives Division: Counter-IED Program and the First Responder*
Joe Foster, Program Manager Explosives Division S&T Directorate, DHS

**Breakout 18:** *IPT Process: Methods and Results*
Mr. Bob Hooks, Director of Transition, S&T Directorate

**Breakout 20:** *S&T Pilot Programs in California: A User Perspective*
Steve Weiss, Five-Year NIMS Training Plan: An Example of an HSI Task

**Breakout 21:** International B: Sweden RAKEL Sweden's new shared digital radio communication system for emergency management

- Mr. Stefan Kvarnerås, Swedish Emergency Management Agency
- Mr. Anders Åkeson, SAAB, EADS and Eltel Consortium

**Breakout 23:** *Mission and Goals of the Human Factors Division: Social-Behavioral Threat Analysis*
Sharla Rausch, Ph.D., Division Head, Human Factors Division: Social-Behavioral Threat Analysis,

**Breakout 24:** *Explosives Division B Response/Render Safe— Developing Future Requirements for the First Responder*

- Mr. Joe Foster, Program Manager Explosives Division S&T Directorate, DHS
- Kelly Bray, Explosives Division S&T Directorate, DHS

**Breakout 27:** *S&T Laboratories A: Environmental Measurements Laboratory Support to State & Local First Responders*

- Dr. Adam Hutter, Director, EML
- Mr. Lawrence Ruth, Director, Systems Division, EML

**Breakout 28:** *International C: United Kingdom National Police Improvement Agency*
Mr. Richard Earland, Chief Information Officer, National Police Improvement Agency

**Breakout 29:** Command, Control & Interoperability Division RDT&E for Emergency Responders.
**Panelists:**

- Chief Charles Werner, Charlottesville, VA Fire Department
- Mr. Dereck Orr, Program Manager for Public Safety Communication Standards, Office of Law Enforcement, Standards National Institute of Standards and Technology
- Dr. Carolyn Ford, Institute for Telecommunication Sciences, National Telecommunications and Information Administration
- Angela M. Ervin, Ph.D. Program Manager Chem Bio R&D Branch ChemBioR&DBran, Science and Technology Directorate Department of Homeland Security
    - Video Windows Media player video clip

**Breakout 30:** *Mission and Goals of the Human Factors Division: Human-Systems Research and Engineering*

- Sharla Rausch, Ph.D., Division Head, Human Factors Division:Human-Systems Research and Engineering/Biometrics
- Sharla Rausch, Ph. D, Division Head, S&T Human Factors Division: Overview

**Breakout 33:** *Technology Clearing House*
Ms. Sonja Rodriguez, Director, Tech Clearinghouse, DHS S&T

**Breakout 34:** The Transportation Security Laboratory
Dr. Susan Hallowell, Director, TSL

- 300 Pressurized Windows Media player mpeg movie file
- ULD seen from cargo hold Windows Media player mpeg movie file

# 2008 Homeland Security S&T Stakeholders Conference West

## *"Putting First Responders First"*

Presented by NDIA with Technical Assistance from the Science & Technology Directorate, Department of Homeland Security

***"All session times, topics, and speakers subject to change"***

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|---|---|---|---|---|---|---|---|
| ***Monday January 14, 2008*** | | **Pre-Conference Training Workshop** | | | | | |
| ***Time*** | | ***Event Title*** *(Location)* | | | | | |
| 8:00a -5:00p | | **On-Site Conference Registration** | | | | | |
| 9:00a -4:45p | | **Training Sessions** ("LES" = Law Enforcement Sensitive - separate registration required) | | | | | |
| 9:00a-9:45a | | Training Workshop Track 1 & 2<br>**Training Session 1-2**<br>**Overview: Doing Business with DHS S&T**<br>Ms. Soraya Correa, Director, Office of Procurement Operations, DHS *(confirmed)* | Training Workshop Track 3<br>**Training Session 3**<br>*Science & Technology for First Responders*<br>**Better Security via Randomization: A Game Theoretic Approach and its Operationalization at the Los Angeles International Airport**<br>Dr. Milind Tambe Professor of Computer Science, USC *(confirmed)* | Training Workshop Track 4<br>**Training Session 4**<br>*Science & Technology Training for First Responders*<br>***Crisis Communication 1***<br>**Risk Communications and Public Warnings: Briefout from the July workshop**<br>**Moderator:**<br>Dennis Mileti *(confirmed)* | Training Workshop Track 5<br>**Training Session 5**<br>**Scholars in Homeland Security**<br>Mr. Will McCormick<br>SDSU | Training Workshop Track 6<br>**Training Session 6**<br>*Science & Technology Training for First Responders*<br>**IED Training for First Responders**<br>(LES)<br>**IED 101**<br>**IED Lessons Learned from Iraq**<br>Lt. Col. Max Velte, US Army | Training Workshop Track 7<br>**Training Session 7**<br>*Science & Technology Training for First Responders*<br>**ALLHAZ Providing a Common Operating Picture for Emergency Management**<br>Elizabeth J. Matlack<br>Director<br>National Center for Biodefense Communications *(confirmed)* |
| 9:45a-10:00a | | **Transition Break** | | | | | |
| 10:00a-10:45a | | Training Workshop Track 1<br>**Training Session 8**<br>*Doing Business with DHS S&T*<br>**Small and Disadvantaged Business Opportunities**<br>Ms. Phyllis Miriashtiani<br>Small Business Advocate<br>Office of Small and Disadvantaged Business Utilization<br>Office of Procurement Operations, DHS *(confirmed)* | Training Workshop Track 2<br>**Training Session 9**<br>**Things to Remember when Doing Business in (h)omeland (s)ecurity**<br>Mr. David Olive<br>Olive Edwards & Cooper, LLC *(confirmed)*<br>Mr. Rich Cooper<br>Olive, Edwards & Cooper, LLC *(confirmed)*<br>David McWhorter<br>Olive, Edwards & Cooper, LLC *(confirmed)* | Training Workshop Track 3<br>**Training Session 10**<br>*Science & Technology Training for First Responders*<br>**Interoperability Training: An Introduction to Specific Tools for Communications Interoperability Improvement**<br>Luke Klein-Berndt<br>CTO, CCI, DHS S&T *(confirmed)*<br>Michael Skena,<br>Touchstone Consulting *(confirmed)*<br>Jeff Phaneuf,<br>Touchstone Consulting *(confirmed)* | Training Workshop Track 4<br>**Training Session 11**<br>*Science & Technology Training for First Responders*<br>***Crisis Communication 2***<br>**Risk Communications and the New Media**<br>**Moderator:**<br>Lynn Goldman PACER *(confirmed)*<br>**Panelists:**<br>Mr. Jay Alan<br>Deputy Director for Communications, California Office of Homeland Security *(confirmed)*<br>Mr. Michael Bustamante<br>former Press Secretary for Governor of California | Training Workshop Track 5<br>**Training Session 12**<br>*Science & Technology Training for First Responders*<br>**IED 101**<br>TBA<br>National Protection & Programs Directorate,<br>DHS | Training Workshop Track 6<br>**Training Session 13**<br>**IED Training for First Responders**<br>(LES)<br>***Incident Response to Terrorist Bombings 1***<br>EMRTC, New Mexico Tech | Training Workshop Track 7<br>**Training Session 14**<br>*Science & Technology Training for First Responders*<br>**Homeland Defense Operational Planning System (HOPS)**<br>John Crandley<br>Training Director, HOPS<br>Lawrence Livermore National Laboratory *(confirmed)* |

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| | | | | | *(confirmed)*<br><br>Mr. Jeff Macedo,<br>Deputy Press Secretary<br>Governor of California<br>*(confirmed)*<br><br>TBA | | | |
| 10:45a-11:00a | | **Networking Coffee Break** *(TBD)* | | | | | | |
| 11:00a-11:45a | | Training Workshop Track 1<br>**Training Session 15**<br><br>*Doing Business with DHS S&T*<br><br>**Current Science & Technology Business Opportunities**<br><br>Ms. Wanda Armwood,<br>Associate Director<br>Office of Procurement<br>Operations, DHS *(confirmed)* | Training Workshop Track 2<br>**Training Session 16**<br><br>**What the Homeland Security Institute is and does**<br><br>Mr. Phil Anderson<br>Director HSI *(confirmed)* | Training Workshop Track 3<br>**Training Session 17**<br><br>*Science & Technology Training for First Responders*<br><br>**Federated Simulation Based Training, Exercise, and Lessons Learned**<br><br>Jalal Mapar, Program Manager,<br>IGD, DHS S&T *(confirmed)* | Training Workshop Track 4<br>**Training Session 18**<br><br>*Science & Technology Training for First Responders*<br><br>***Crisis Communication 3***<br>**State Model Systems & Gaps**<br><br>**Moderator:**<br>Lynn Goldman PACER<br><br>**Panelists:**<br>Mr. Chris Logan, National Governors Association, Program Director for Homeland Security *(confirmed)* | Training Workshop Track 5<br>**Training Session 19**<br><br>*Science & Technology Training for First Responders*<br><br>**Explosive Detection Technology: What Do First Responders Really Want? Part 1**<br><br>Dr. Susan Hallowell<br>Director, TSL *(confirmed)* | Training Workshop Track 6<br>**Training Session 20**<br><br>**IED Training for First Responders**<br>(LES)<br><br>***Incident Response to Terrorist Bombings 2***<br><br>EMRTC, New Mexico Tech | Training Workshop Track 7<br>**Training Session 21**<br><br>**Workforce Development at the Frontier of DHS: Relevant Science, Technology, Engineering and Mathematics**<br><br>**Moderator:**<br>Tom Kowalczyk, Office of University programs, DHS S&T *(confirmed)*<br><br>**Panelists:**<br>Dr. Mike Zyda<br>Director of GamePipe Lab<br>USC<br><br>Dr. Isaac Maya<br>Research Director<br>CREATE, USC *(confirmed)*<br><br>Mr. Daniel Wendel<br>Teacher Education Program<br>MIT *(confirmed)*<br><br>Mr. Adam Jascoff<br>NIST, Dept. of Commerce<br>*(confirmed)*<br><br>Mr. Justin Wolf, PNNL<br>*(confirmed)*<br><br>Ms. Cindy Randall<br>FIRST (For Inspiration and Recognition of Science and Technology) *(confirmed)* |
| 11:45a-12:00 p. | | **Transition Break** | | | | | | |
| 12:00p-12:45 p | | Training Workshop Track 1<br>**Training Session 22**<br><br>*Doing Business with DHS S&T*<br><br>**10 Reasons Why You Should Partner with DHS S&T**<br><br>Dr. Tom Cellucci<br>Chief Commercialization Officer<br>DHS S&T Directorate<br>*(confirmed)* | Training Workshop Track 2<br>**Training Session 23**<br><br>**Homeland Security Institute**<br><br>**TBA** | Training Workshop Track 3<br>**Training Session 24**<br><br>*Science & Technology Training for First Responders*<br><br>**U.S. Secret Service Escape Hood Technology**<br><br>Mr. Tony Chapa<br>Deputy Assistant Director<br>United States Secret Service<br>*(confirmed)* | Training Workshop Track 4<br>**Training Session 25**<br><br>*Science & Technology Training for First Responders*<br><br>***Crisis Communication 4***<br>**Local Viewpoints**<br><br>**Moderator:**<br>Lynn Goldman PACER<br><br>**Panelists:**<br>Mr. Jay Alan<br>Deputy Director for Communications, California Office of Homeland Security *(confirmed)*<br><br>Mr. Ron Lane, San Diego County Emergency Services Director *(confirmed)*<br><br>Ms. Ladona Harvey,<br>Morning News Anchor<br>KOGO 600 AM Radio<br>San Diego, CA<br>*(confirmed)* | Training Workshop Track 5<br>**Training Session 26**<br><br>*Science & Technology Training for First Responders*<br><br>**Explosive Detection Technology: What Do First Responders Really Want? Part 2**<br><br>Dr. Susan Hallowell<br>Director, TSL *(confirmed)* | Training Workshop Track 6<br>**Training Session 27**<br><br>**IED Training for First Responders**<br>(LES)<br><br>***Incident Response to Terrorist Bombings 3***<br><br>EMRTC, New Mexico Tech | |
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| 12:45p-2:00p | | **No-Host Networking Lunch in Convention Center Food Court** | | | | | | |

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| | Training Workshop Track 1<br>**Training Session 28** | Training Workshop Track 2<br>**Training Session 29** | Training Workshop Track 3<br>**Training Session 30** | Training Workshop Track 4<br>**Training Session 31** | Training Workshop Track 5<br>**Training Session 32** | Training Workshop Track 6<br>**Training Session 33** | Training Workshop Track 7<br>**Training Session 34** |
| 2:00p-2:45p | *Doing Business with DHS S&T*<br>**SBIR Tutorial**<br>Ms. Lisa Sobolewski<br>DHS S&T *(confirmed)* | **Next Generation Tech Transfer: Incubation, Rapid Prototyping, Tech Scouting**<br>Mr. Roger London,<br>*(confirmed)* | *Science & Technology Training for First Responders*<br>**The Future of Wireless and First Responders**<br>Mr. Juan Deaton<br>Critical Infrastructure Protection<br>Idaho National Laboratory<br>*(confirmed)* | *Science & Technology Training for First Responders*<br>***Crisis Communication 5***<br>**How Do You Communicate During a Crisis?**<br>***A live broadcast on the "Homeland Security Inside & Out" radio program***<br>**Moderator:**<br>Dr. David McIntyre, Texas A&M University; Director, Integrative Center for Homeland Security at Texas A&M University, Co-Host, "*Homeland Security Inside & Out*"<br>**Media Panelists:**<br>Allison Barrie, FOX News<br>TBA | **National Trends in Homeland Security Education**<br>Mr. Eric Frost<br>Co-Director, Homeland Security Master's Program<br>San Diego State University<br>*(confirmed)*<br>Dr. Stanley Supinski<br>Director of Partnership Programs<br>Naval Postgraduate School<br>*(confirmed)*<br>Dr. Tracy DeWitt<br>Professor<br>University of Arkansas<br>*(confirmed)*<br>Dr. Hilda Blanco<br>University of Washington<br>*(confirmed)* | **IED Training for First Responders**<br>(LES)<br>***Incident Response to Terrorist Bombings 4***<br>EMRTC, New Mexico Tech | **SIGMA: Science Fiction in the National Interest**<br>**Moderator:**<br>Dr. Arlan Andrews, Sr.<br>**Panelists:**<br>Greg Bear<br>David Brin<br>Michael Cassutt<br>Larry Niven<br>Jerry Pournelle<br>Walter Jon Williams |
| 2:45p-3:00p | **Networking Coffee Break** *(TBD)* | | | | | | |
| | Training Workshop Track 1<br>**Training Session 35** | Training Workshop Track 2<br>**Training Session 36** | Training Workshop Track 3<br>**Training Session 37** | Training Workshop Track 4<br>**Training Session 38** | Training Workshop Track 5<br>**Training Session 39** | Training Workshop Track 6<br>**Training Session 40** | Training Workshop Track 7<br>**Training Session 41** |
| 3:00p-3:45p | *Doing Business with DHS S&T*<br>**Raising Capital Panel: Harnessing Global Security Opportunities**<br>**Moderator:**<br>Mr. Tom Cellucci<br>Chief Commercialization Officer<br>DHS S&T Directorate<br>*(confirmed)*<br>**Panelists:**<br>Matt McCooe<br>Managing Partner<br>Chart Venture Partners<br>Ms. Kelsey Kohler<br>Executive Director<br>Watervliet Innovation Center | **Best Practices In Leveraging The DHS Consolidated Acquisition Strategy**<br>Mr. Sean Burke<br>President, Govplace *(confirmed)* | *Science & Technology Training for First Responders*<br>**Preparing First Responders for Food Systems Disasters**<br>Jerry Gillespie, DVM, PhD<br>Director, Western Institute for Food Safety and Security<br>Paul Friedrich<br>DHS Agroterrorism Preparedness Curriculum Coordinator<br>Western Institute for Food Safety and Security | **Blogging for Technology: Science and the New Media**<br>**Moderator:**<br>Mr. Matt Armstrong<br>Publisher www.mountainrunner.us<br>*(confirmed)*<br>**Panelists:**<br>Allison Barrie, FOX News<br>*(confirmed)*<br>TBA | **Technology Adoption & Innovation 1**<br>Dr. Neal Thornberry<br>Innovation Chair<br>Graduate School of Business and Public Policy<br>Naval Postgraduate School<br>Dr. Anita Salem<br>Research Associate<br>Center for Defense Management Reform<br>Graduate School of Business and Public Policy<br>Naval Postgraduate School | **IED Training for First Responders**<br>(LES)<br>***Incident Response to Terrorist Bombings 5***<br>EMRTC, New Mexico Tech | *Science & Technology Training for First Responders*<br>**TechSolutions*:* Solutions for First Responders**<br>Greg Price<br>Director, TechSolutions<br>DHS S&T *(confirmed)* |
| 3:45p-4:00p | **Transition Break** | | | | | | |

| | | Training Workshop Track 1 | Training Workshop Track 2 | Training Workshop Track 3 | Training Workshop Track 4 | Training Workshop Track 5 | Training Workshop Track 6 | Training Workshop Track 7 |
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| | | **Training Session 42** | **Training Session 43** | **Training Session 44** | **Training Session 45** | **Training Session 46** | **Training Session 47** | **Training Session 48** |
| 4:00p-4:45p | | *Doing Business with DHS S&T*<br>**The SAFETY Act**<br>Ms. Sylvia Cabrera<br>Office of SAFETY Act Implementation<br>S&T Directorate, DHS<br>*(confirmed)* | **The American Security Challenge**<br>Mr. Roger London<br>*(confirmed)* | *Science & Technology Training for First Responders*<br>**GIS Response to the 2007 San Diego Wildfires**<br>Paul Hardwick<br>GIS Project Manager<br>Center for Homeland Security, SDSU Research Foundation<br>*(confirmed)* | **Science As Diplomacy**<br>**Moderator:**<br>Mr. Matt Armstrong<br>Publisher www.mountainrunner.us<br>*(confirmed)*<br>**Panelists:**<br>Dr. Mayya Tokman<br>Professor of Applied Mathematics<br>University of California Merced<br>Mr. Andy Perkins<br>Science & Innovation Officer<br>British Consulate-General Los Angeles, CA | **Technology Adoption & Innovation 2**<br>Dr. Neal Thornberry<br>Innovation Chair<br>Graduate School of Business and Public Policy<br>Naval Postgraduate School<br>*(confirmed)*<br>Dr. Anita Salem<br>Research Associate<br>Center for Defense Management Reform<br>Graduate School of Business and Public Policy<br>Naval Postgraduate School<br>*(confirmed)* | **IED Training for First Responders**<br>(LES)<br>***Incident Response to Terrorist Bombings 6***<br>EMRTC, New Mexico Tech | **How Real-Time Video Distribution Changes Homeland Security Mission Profiles** |
| 4:45p-5:00p | | **Transition Break** | | | | | | |
| 5:00p | | **Exhibit Hall Ribbon Cutting** | | | | | | |
| 5:00p-7:00p | | **"Salute to Law Enforcement" Welcome Reception in Exhibit Hall** | | | | | | |
| 7:00p | | **Exhibit Hall closes** | | | | | | |

| ***Tuesday January 15, 2008*** | | **2008 Homeland Security S&T Stakeholders Conference West**<br>***"Putting First Responders First"***<br>**Day 1 - Morning Session** |
|---|---|---|
| ***Time*** | | ***Event Title*** *(Location)* |
| 7:00a-5:00p | | **On-Site Conference Registration & Information** |
| 8:00a-9:00a | | **Continental Breakfast** |
| 9:00a-6:00p | | **Exhibit Hall Open** |
| 9:00a-4:00p<br>*(In parallel with other activities)* | | **Innovation Gateway Marketplace Networking**<br>*(By appointment only – abstract submittal in advance required)*<br>**SAFETY Act Pre-Application Consulting**<br>*(By appointment only in SAFETY Act Booth)* |
| 8:30a-9:00a | | **nTag Training Session and Audience Surveys** |

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| 9:00a-9:10a | | **Opening Ceremony**<br>**Conference Overview & General Info**<br>Maj. Gen. Barry Bates, USA (Ret.), Director of Operations, NDIA *(confirmed)* |
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| 9:10a-9:20a | | **Conference Host Welcome**<br>TBA<br>**Welcome & Introduction of Under Secretary for Science & Technology**<br>Mr. Matthew Bettenhausen, Executive Director, State of California/Governor's Office of Homeland Security *(confirmed)* |
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| 9:20a-9:30a | | **Opening Remarks and Introduction of Keynote Speaker**<br>The Honorable Jay M. Cohen, Under Secretary, Science and Technology, DHS *(confirmed)* |
| 9:30a-9:50a | | **Keynote Speaker**<br>TBA |
| | | |
| 9:50a-10:10a | | **Science & Technology Directorate Keynote**<br>The Honorable Jay M. Cohen, Under Secretary, Science and Technology, DHS *(confirmed)* |
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| 10:10a-10:40a | | **Networking Coffee Break** *(TBD)* |
| | | |
| 10:40a-11:00a | | **Keynote Speaker**<br>Mr. Erroll G. Southers, Chief of Intelligence and Counter-Terrorism, Los Angeles World Airports Police Department *(confirmed)* |
| | | |
| 11:00a-11:45p | | **S&T Challenges Affecting the States** *(TBD)*<br>**Moderator:**<br>Ms. Linda Vasta , Director, West Coast Operations, Interagency Coordination Office, S&T Directorate, DHS *(confirmed)*<br>**Panelists:**<br>Mr. Matthew Bettenhausen, Executive Director, State of California/Governor's Office of Homeland Security *(confirmed)*<br>Mr. Kerry Sleeper, Commissioner, Vermont Department of Public Safety *(confirmed)*<br>BG Mike McDaniel, Homeland Security Advisor, Michigan Department of Military & Veterans Affairs *(confirmed)*<br>Ms. Annzell Loufas, Director, California Council on S&T *(invited)* |
| | | |
| 11:45a-12:30p | | **S&T Challenges Affecting First Responders** *(TBD)*<br>**Moderator:**<br>Mr. Glenn Cannon, Director, Response Division, FEMA *(confirmed)*<br>**Panelists:**<br>Chief Robert Ingram, Branch Chief for WMD, Fire Department, City of New York *(confirmed)*<br>Mr. James T. Butts, Jr., Deputy Executive Director, Airport Law Enforcement and Protective Services, Los Angeles World Airports *(confirmed)*<br>Mr. John Powell, Chairman, California Statewide Interoperability Executive Committee (CALSIEC) *(invited)*<br>Commander Bob Sedita, County of Los Angeles Sheriff's Department *(confirmed)*<br>Mr. Richard Earland, Chief Information Officer, National Police Improvement Agency, United Kingdom *(confirmed)*<br>Captain Jeff Winn, Commander, Research and Planning, New Orleans Police Department *(invited)* |
| | | |
| 12:30p-2:00p | | **Networking Lunch in Exhibit Hall** |
| | | |

| | | |
|---|---|---|
| ***Tuesday***<br>***January 15, 2008*** | | **2008 Homeland Security S&T Stakeholders Conference West**<br>***"Putting First Responders First"***<br>**Day 1 - Afternoon Session** |
| | | |
| ***Time*** | | ***Event Title*** *(Location)* |

| | | |
|---|---|---|
| 2:00p-4:30p | | ***"View Exhibits Only"* admission to Exhibit Hall** |
| | | |
| 2:00p-2:20p | | **First Responder Technologies (R-Tech)**<br>Mr. Jose Vasquez, Director, Director, First Responder Technologies , S&T Directorate, DHS *(confirmed)* |
| | | |
| 2:20p-2:50p | | **Secure Against Fires & Embers (SAFE)**<br>TBA |
| | | |
| 2:50p-3:00p | | **Anaheim Enterprise Virtual Operations Center (EVOC)**<br>Mr. Tom Wood, Assistant City Manager/COO, City of Anaheim, California *(confirmed)* |
| | | |
| 3:00p-3:15p | | **Transition Break** |
| | | |
| | | **Science & Technology Breakout Sessions** |

| | | S&T Track 1<br>**Breakout 1** | S&T Track 2<br>**Breakout 2** | S&T Track 3<br>**Breakout 3** | S&T Track 4<br>**Breakout 4** | S&T Track 5<br>**Breakout 5** | S&T Track 6<br>**Breakout 6** | S&T Track 7<br>**Breakout 7** |
|---|---|---|---|---|---|---|---|---|
| 3:15p-4:00p | | **TechSolutions*:* Solutions for First Responders**<br><br>Mr. Greg Price<br>Director, TechSolutions<br>DHS S&T | ***Who you gonna call?***<br>**The National Guard's First Responder Role**<br><br>**Moderator:**<br>Col. Michael Smith, USA (Ret.), Senior Advisor, Office Interagency Programs, DHS S&T *(confirmed)*<br><br>**Panelists:**<br>TBA | **Advanced Technologies for First Responders and Incident Management Teams**<br><br>Jalal Mapar, Program Manager<br>DHS S&T *(confirmed)* | **California Burning: Lessons Learned** | **Use of Modeling & Simulation for California's Golden Guardian Exercise 07**<br><br>Michael Mercer<br>Associate Program Manager<br>Systems Solutions Group<br>Lawrence Livermore National Laboratory *(confirmed)*<br><br>Patrick T. Hammond Sr.<br>Homeland Security Training Professional<br>California Office of Homeland Security *(confirmed)*<br><br>Sergeant Brian McElhaney<br>Homeland Security Bureau<br>Anaheim Police Department *(confirmed)*<br><br>Battalion Chief Tim O'Hara<br>Homeland Security Manager<br>Anaheim Fire Department *(confirmed)* | **Innovation at the Edge - Accelerating University and National Lab Research to First/Early Responders**<br><br>**Moderator:**<br>Tom Kowalczyk, Office of University programs, DHS S&T *(confirmed)*<br><br>**Panelists:**<br>Dr. William Pottenger<br>Research Professor<br>Rutgers University *(confirmed)*<br><br>Dr. Richard May<br>Chief Scientist Visual Analytics<br>PNNL *(confirmed)*<br><br>Ms. Carol Maresca<br>Deputy Superintendent of Police/ Deputy Director<br>Public Safety Department, NY&NJ Port Authority *(confirmed)*<br><br>Mr. Gerard Lorden<br>Morgan Stanley *(confirmed)* | **Managing the cultural change when a common operational picture platform is implemented**<br><br>Mr. Wayne Tolosa<br>President and CEO<br>Future Concepts I.S., Inc. |
| 4:00p-4:15p | | **Transition Break** | | | | | | |

| | | S&T Track 1<br>**Breakout 8** | S&T Track 2<br>**Breakout 9** | S&T Track 3<br>**Breakout 10** | S&T Track 4<br>**Breakout 11** | S&T Track 5<br>**Breakout 12** | S&T Track 6<br>**Breakout 13** | S&T Track 7<br>**Breakout 14** |
|---|---|---|---|---|---|---|---|---|
| 4:15p-5:00p | | **FirstResponder.gov** | **Critical Infrastructure Inspection Management System (CIIMS) Working in Maryland**<br><br>**Moderator:**<br>Herb Engle, Program Manager, DHS S&T *(confirmed)*<br><br>**Panelists:**<br>LT. Mark Gibbons, Maryland State Police *(confirmed)*<br><br>Sgt. Chad Gainey, Maryland State Police *(confirmed)*<br><br>Mr. Dan Rice<br>Aviation Command<br>Maryland State Police<br><br>Mr. Mark Gabriele<br>Applied Physics Laboratory<br>Johns Hopkins University<br>*(confirmed)* | **IED 101**<br><br>LAPD Bomb Squad | **Katrina: Law Enforcement Lessons Learned**<br><br>Captain Jeff Winn<br>Commander,<br>Research and Planning<br>New Orleans Police Department<br>*(confirmed)* | **Northwest Regional Technology Center for Homeland Security: A Model for Connecting State and Local Needs and DHS S&T's Research Agenda**<br><br>Steve Stein, Director<br>NW Regional Technology Center for Homeland Security<br>Pacific Northwest National Labs<br>*(confirmed)*<br><br>Mary E Peterson<br>Pacific Northwest National Labs<br>*(confirmed)*<br><br>Ann M Lesperance<br>Pacific Northwest National Labs<br>*(confirmed)* | **Anaheim Enterprise Virtual Operations Center (EVOC)**<br><br>Mr. Tom Wood, Assistant City Manager/COO, City of Anaheim, California *(confirmed)* | *International A:*<br><br>**Lessons Learned from Israel**<br><br>Major General Doron Almog<br>Executive Chairman,<br>Athlone Global Security<br>*(confirmed)* |
| | | | | | | | | |
| 4:30p | | **"*View Exhibits Only*" admission to Exhibit Hall ends** | | | | | | |
| | | | | | | | | |
| 5:00p-7:00p | | **"Fire Fighters Salute" Reception in Exhibit Hall** | | | | | | |
| | | | | | | | | |
| 7:00p | | **Exhibit Hall Closes** | | | | | | |
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| ***Wednesday, January 16, 2008*** | | **2008 Homeland Security S&T Stakeholders Conference West**<br>***"Putting First Responders First"***<br>**Day 2 - Morning Session** |
|---|---|---|
| | | |
| ***Time*** | | ***Event Title*** *(Location)* |
| | | |
| 8:00a-5:00p | | **On-Site Conference Registration & Information** |
| | | |
| 8:00a-9:00a | | **Continental Breakfast** *(TBD)* |
| | | |
| 9:00a-6:00p | | **Exhibit Hall Open** |
| | | |
| 9:00a-4:00p | | **"*View Exhibits Only*" admission to Exhibit Hall** |
| | | |
| 9:00a-4:00p<br>*(In parallel with other activities)* | | **Innovation Gateway Marketplace Networking**<br>*(By appointment only – abstract submittal in advance required)*<br>**SAFETY Act Pre-Application Consulting**<br>*(By appointment only in SAFETY Act Booth)* |

| | | |
|---|---|---|
| 9:00a-9:15a | | **Host Remarks** |
| | | |
| 9:15a-9:25a | | **The DHS Science & Technology Directorate**<br>The Honorable Jay M. Cohen, Under Secretary, Science and Technology, DHS *(confirmed)* |
| | | |
| 9:25a-10:25a | | **S&T Directorate Division Heads Panel**<br>Mr. Jim Tuttle, Explosives Division *(confirmed)*<br>Dr. Beth George, Chemical & Biological Division (*Acting) (confirmed)*<br>Dr. David Boyd, Command, Control & Interoperability Division *(confirmed)*<br>CAPT David Newton, USCG, Borders & Maritime Security Division (*Acting) (confirmed)*<br>Dr. Sharla Rausch, Human Factors Division *(confirmed)*<br>Mr. Christopher Doyle, Infrastructure & Geophysical Division *(confirmed)* |
| | | |
| 10:25a-10:40a | | **T&E and Standards**<br>Mr. George Ryan, Director, Test & Evaluation and Standards, S&T Directorate, DHS *(confirmed)* |
| | | |
| 10:40-11:10a | | **Networking Coffee Break** *(Exhibit Hall)* |
| | | |
| 11:10a-12:10p | | **S&T Portfolio Directors Panel**<br>Mr. Robert Hooks, Director of Transition *(confirmed)*<br>Dr. Roger McGinnis, Director of Innovation / HSARPA *(confirmed)*<br>Dr. Starnes Walker, Director of Research *(confirmed)* |
| | | |
| 12:10p-12:20p | | **Basic Research to Enable a Safer Nation**<br>Mr. Bryan Roberts, Program Manager and Economist, University Programs, S&T Directorate, DHS *(confirmed)*<br>Mr. James Johnson, Director, Office of National Laboratories, S&T Directorate, DHS *(confirmed)* |
| | | |
| 12:20p-12:30p | | **Los Angeles Regional Common Operational Picture Program (LARCOPP)**<br>TBA |
| | | |
| 12:30p-2:00p | | ***Networking Lunch in Exhibit Hall*** |

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|---|---|---|
| ***Wednesday January 16, 2008*** | | **2008 Homeland Security S&T Stakeholders Conference West**<br>***"Putting First Responders First"***<br>**Day 2 - Afternoon Session** |
| | | |
| ***Time*** | | ***Event Title*** *(Location)* |
| | | |
| 2:00p-4:30p | | ***"View Exhibits Only"*** **admission to Exhibit Hall** |
| | | |
| | | **Science & Technology Breakout Sessions** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **S&T Track 1**<br>**Breakout 15**<br><br>**Chemical and Biological Division A** | **S&T Track 2**<br>**Breakout 16**<br><br>**Borders and Maritime Security Division** | **S&T Track 3**<br>**Breakout 17**<br><br>*Explosives Division A*<br><br>**Explosives Division: Counter-IED Program and the First Responder**<br><br>Mr. Jim Tuttle, Head Explosives Division, S&T Directorate, DHS *(confirmed)*<br><br>Joe Foster<br>Program Manager<br>Explosives Division<br>S&T Directorate, DHS *(confirmed)*<br><br>Kelly Bray<br>Explosives Division<br>S&T Directorate, DHS *(confirmed)* | **S&T Track 4**<br>**Breakout 18**<br><br>**IPT Process: Methods and Results**<br><br>Mr. Bob Hooks<br>Director of Transition,<br>S&T Directorate *(confirmed)* | **S&T Track 5**<br>**Breakout 19**<br><br>*University Programs A:*<br><br>**TBA** | **S&T Track 6**<br>**Breakout 20**<br><br>**S&T Pilot Programs in California: A User Perspective**<br><br>Lawrence Livermore National Laboratory | **S&T Track 7**<br>**Breakout 21**<br><br>*International B:*<br>**Sweden**<br><br>**RAKEL**<br>**Sweden's new shared digital radio communication system for emergency management**<br><br>Mr. Stefan Kvarnerås, Swedish Emergency Management Agency *(confirmed)*<br><br>Mr. Anders Åkeson<br>SAAB, EADS and Eltel Consortium *(confirmed)* |
| 2:00-2:45 p.m. | | | | | | | | |
| 2:45-3:00 p.m. | | **Transition Break** | | | | | | |
| | | **S&T Track 1**<br>**Breakout 22**<br><br>**Chemical and Biological Division B** | **S&T Track 2**<br>**Breakout 23**<br><br>**Mission and Goals of the Human Factors Division: Social-Behavioral Threat Analysis**<br><br>Allison Smith<br>Program Lead for Radicalization Research<br>HFD, DHS S&T *(confirmed)*<br><br>Mike Dunaway<br>Program Manager Community Preparedness and Resilience Projects<br>HFD, DHS S&T *(confirmed)* | **S&T Track 3**<br>**Breakout 24**<br><br>*Explosives Division B*<br><br>**Response/Render Safe—Developing Future Requirements for the First Responder**<br><br>Mr. Jim Tuttle, Head Explosives Division, S&T Directorate, DHS *(confirmed)*<br><br>Mr. Joe Foster<br>Program Manager<br>Explosives Division<br>S&T Directorate, DHS *(confirmed)*<br><br>Kelly Bray<br>Explosives Division<br>S&T Directorate, DHS *(confirmed)* | **S&T Track 4**<br>**Breakout 25**<br><br>**Special Programs**<br><br>Mr. Spanky Kirsch, Director, Special Programs, DHS S&T *(confirmed)* | **S&T Track 5**<br>**Breakout 26**<br><br>*University Programs B:*<br><br>**TBA** | **S&T Track 6**<br>**Breakout 27**<br><br>*S&T Laboratories A:*<br>**Environmental Measurements Laboratory Support to State & Local First Responders**<br><br>Dr. Adam Hutter, Director, EML *(confirmed)*<br><br>Mr. Lawrence Ruth, Director, Systems Division (acting), EML *(confirmed)* | **S&T Track 7**<br>**Breakout 28**<br><br>*International C:*<br>**United Kingdom**<br><br>**National Police Improvement Agency**<br><br>Mr. Richard Earland<br>Chief Information Officer<br>National Police Improvement Agency *(confirmed)* |
| 3:00-3:45 p.m. | | | | | | | | |
| 3:45-4:00 p.m. | | **Transition Break** | | | | | | |

| | | S&T Track 1<br>**Breakout 29** | S&T Track 2<br>**Breakout 30** | S&T Track 3<br>**Breakout 31** | S&T Track 4<br>**Breakout 32** | S&T Track 5<br>**Breakout 33** | S&T Track 6<br>**Breakout 34** | S&T Track 7<br>**Breakout 35** |
|---|---|---|---|---|---|---|---|---|
| 4:00-4:45 p.m. | | **Command, Control & Interoperability Division**<br><br>**RDT&E for Emergency Responders.**<br><br>**Moderator:**<br>Mr. Luke Klein-Berndt Chief Technology Officer<br>Command, Control and Interoperability Division, DHS S&T *(confirmed)*<br><br>**Panelists:**<br>Chief Charles Werner, Charlottesville, VA Fire Department<br><br>Mr. Dereck Orr<br>Program Manager for Public Safety Communication Standards<br>Office of Law Enforcement Standards<br>National Institute of Standards and Technology<br><br>Dr. Carolyn Ford, Institute for Telecommunication Sciences, National Telecommunications and Information Administration | **Mission and Goals of the Human Factors Division: Human-Systems Research and Engineering**<br><br>Chris Miles<br>Biometrics Program Manager<br>HFD, DHS S&T *(confirmed)*<br><br>Darren Wilson<br>Human Systems Research and Engineering Program Manager<br>HFD, DHS S&T *(confirmed)* | **Infrastructure and Geophysical Division**<br><br>Mr. Christopher Doyle, Head<br>Infrastructure & Geophysical Division *(confirmed)*<br><br>Jalal Mapar, Program Manager<br>DHS S&T *(confirmed)* | **1401 Technology Transfer Process**<br><br>Mr. Bob Hooks<br>Director of Transition,<br>S&T Directorate *(confirmed)* | **Technology Clearing House**<br><br>Mr. Jose Vazquez, Director Rapid Technology Insertion, DHS S&T *(confirmed)*<br><br>Ms. Sonja Rodriguez, Director, Tech Clearinghouse, DHS S&T *(confirmed)* | *S &T Laboratories B:*<br><br>**The Transportation Security Laboratory**<br><br>Dr. Susan Hallowell<br>Director, TSL *(confirmed)* | **HIPS & HITS**<br><br>**The 10% Solution: High Risk, Hugh Payoffs**<br><br>Rolf Dietrich. P.E.<br>Director, Homeworks<br>DHS S&T *(confirmed)* |
| | | | | | | | | |
| 4:00p | | ***"View Exhibits Only"* admission to Exhibit Hall ends** | | | | | | |
| | | | | | | | | |
| 5:00p-7:00p | | **"Emergency Management and Medical Services Salute" Reception in Exhibit Hall** | | | | | | |
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| 7:00p | | **Exhibit Hall Closes** | | | | | | |
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| ***Thursday January 17, 2008*** | | **2008 Homeland Security S&T Stakeholders Conference West**<br>***"Putting First Responders First"***<br>**Day 3 - Morning Session** |
|---|---|---|
| | | |
| ***Time*** | | ***Event Title*** *(Location)* |
| | | |
| 8:00a-12:00p | | **On-Site Conference Registration & Information** |
| | | |
| 8:00a-9:00a | | **Continental Breakfast** *(TBD)* |
| | | |
| 9:00a-9:05a | | **Host Welcome & Introduction** *(TBD)* |
| | | |
| 9:05a-9:30a | | **TBA** |

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| | | |
| 9:30a-11:00a | | **International Perspectives on S&T Research for Homeland Security** *(TBD)*<br>M**oderators:**<br>Mr. Gary Jensen, Director, Asia-Pacific Liaison, International Programs Office, DHS S&T Directorate *(confirmed)*<br>Mr. Matthew Bettenhausen, Executive Director, State of California/Governor's Office of Homeland Security *(confirmed)*<br>**Panelists:**<br>**Australia:**<br>*TBA*<br>**Canada:**<br>Chief Superintendent Bud Mercer, Deputy Criminal Operations Officer, Federal Policing Services, Royal Canadian Mounted Police *(invited)*<br>**Israel:**<br>Mr. Assaf Heffetz, former Commissioner of the Israel National Police *(invited)*<br>Major General Doron Almog, Executive Chairman, Athlone Global Security *(invited)*<br>**Sweden:**<br>Mr. Ivar Rönnbäck, Deputy Director-General, Swedish Rescue Services Agency *(confirmed)*<br>**United Kingdom:**<br>Mr. Richard Earland, Chief Information Officer, National Police Improvement Agency, United Kingdom *(confirmed)* |
| | | |
| 11:00a-11:30a | | **Networking Coffee Break** *(TBD)* |
| | | |
| 11:30a-12:30p | | **Interagency Partnerships in S&T Research for Homeland Security** *(TBD)*<br>**Moderator:**<br>Mr. Randy Zeller, Director, Interagency Coordination, S&T Directorate, DHS *(confirmed)*<br>**Panelists:**<br>CAPT Paul Wiedenhoeft, USCG, Sector Commander/Captain of the Port, U.S. Coast Guard Sector Los Angeles - Long Beach *(confirmed)*<br>Mr. Mark Denari, Director, Aviation Security & Public Safety, San Diego County Regional Airport Authority *(confirmed)*<br>Mr. Daniel Hartwig, Manager of Security Programs, Bay Area Rapid Transit (BART), San Francisco *(invited)*<br>TBA |
| | | |
| 12:30a-1:00p | | **Closing Remarks & Recognition** *(TBD)*<br>The Honorable Jay M. Cohen, Under Secretary for Science and Technology, DHS *(confirmed)* |
| | | |
| 1:00 p.m. | | **Conference Sessions End** |
| | | |
| 1:00p-2:00p | | **Post-Conference No-Host networking lunch in Convention Center Food Court** *(TBD)* |

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| | | |
| ***Thursday January 17, 2008*** | | **Post-Conference Training Workshop** |
| | | |
| 1:00p -6:00p | | **Training Sessions** ("LES" = Law Enforcement Sensitive - separate registration required) |
| | | |
| 1:00p-2:45p | | **IED Training for First Responders** (LES)<br>Transportation Security Laboratory |
| | | |
| 2:45p-3:00p | | **Break** |
| | | |
| 3:00p-3:45p | | **IED Training for First Responders** (LES)<br>Transportation Security Laboratory |
| | | |
| 3:45p-4:00p | | **Break** |
| | | |
| 4:00p-4:45p | | **IED Training for First Responders** (LES)<br>Transportation Security Laboratory |

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|---|---|---|
| | | |
| 4:45p-5:00p | | **Break** |
| | | |
| 5:00p-6:00p | | **IED Training for First Responders** (LES)<br>Transportation Security Laboratory |
| | | |
| 6:00 p.m. | | **Post-Conference Training Workshop Sessions End** |
| | | |

# *WIFSS DHS-Certified National Training Program to Enhance Food Security and Defense*

*presentation*

**2008 Science and Technology Conference**

**Governors Office of Homeland Security**

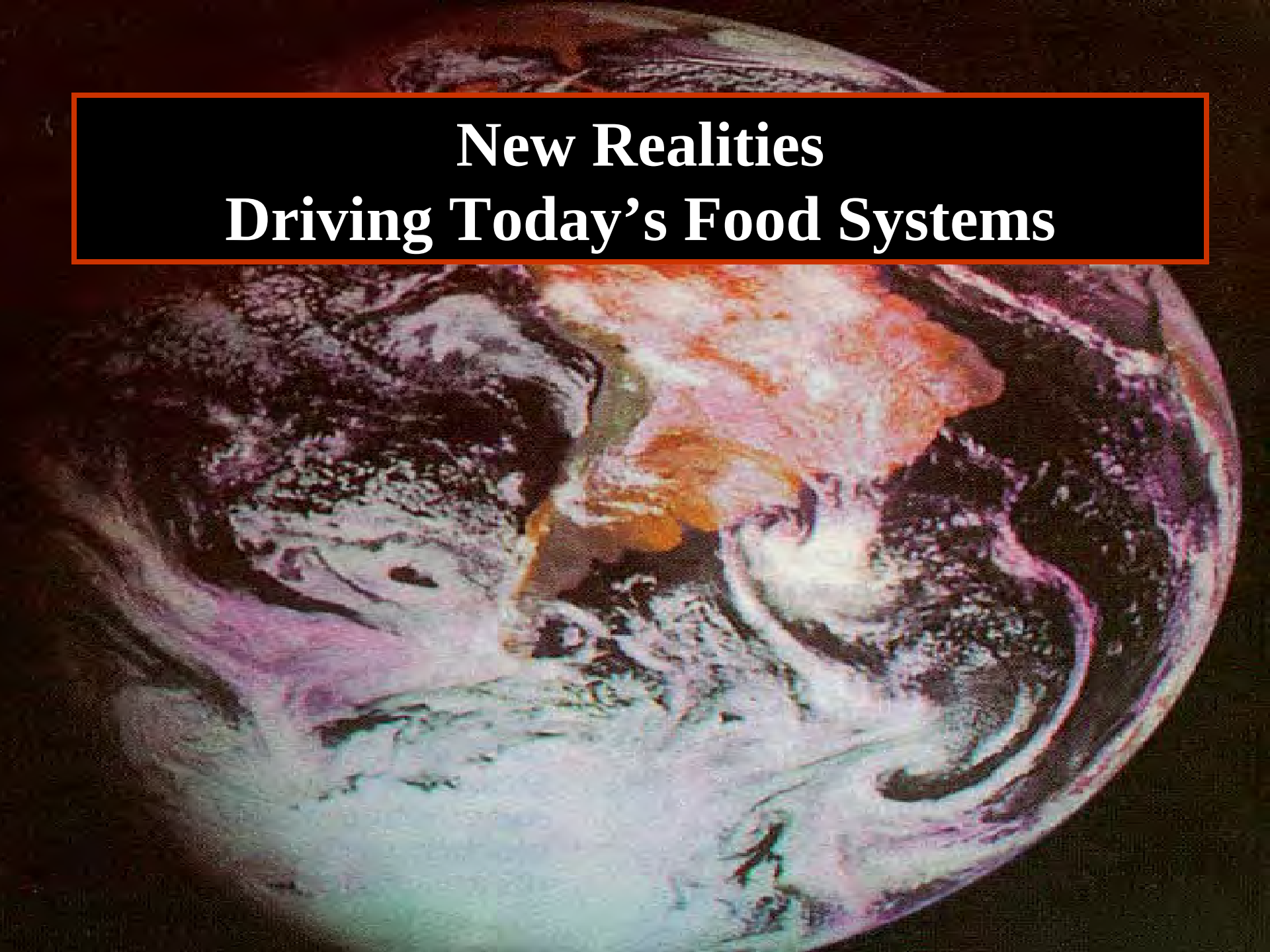
**14 January 2008**

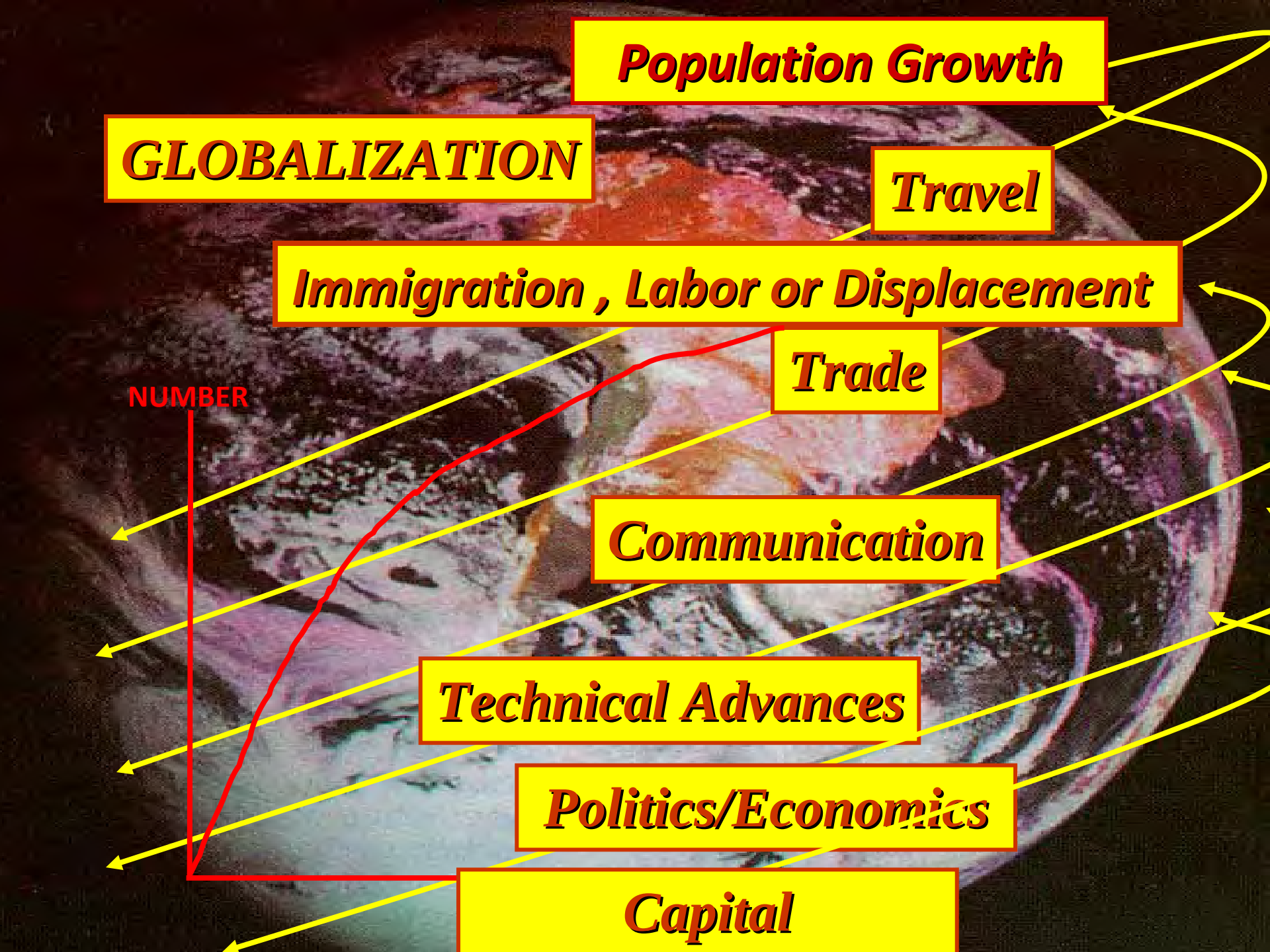
**Jerry R. Gillespie, DVM, PhD.**

**~**

**Director of Food Systems Disaster Training – WIFSS/UCDavis**

# New Realities
# Driving Today's Food Systems

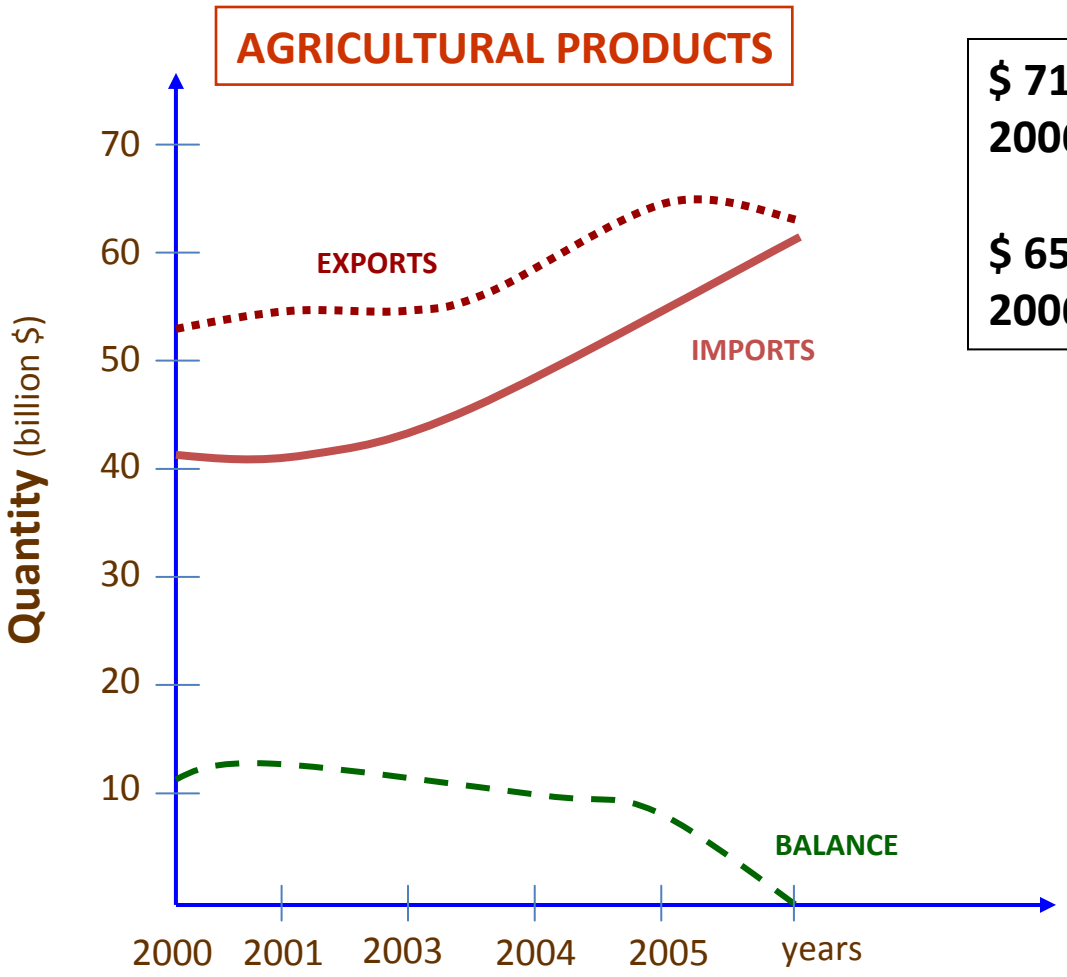



Population Growth
GLOBALIZATION
Travel
Immigration , Labor or Displacement
Trade
NUMBER
Communication
Technical Advances
Politics/Economics
Capital

**New realities that are driving much of today's food systems and --- increasing its vulnerability:**

- **Increasing Population**
- **Globalization**
- **Urbanization**
- **Specialization**
- **Centralization/Concentration**
- **Open System**
- **Changing and Complex**

# US Agricultural Trade, billion $




**$ 71 Billion Export 2006**

**$ 65 Billion Import 2006**

KEY

EXPORTS

IMPORTS

BALANCE

# *WIFSS Homeland Security Training*

## "Training to Enhance Prevention, Deterrence, Response and Recovery from WMD Incidents" 2004

**$4.7 million, 2 years**

**DHS Training Division Competitive Grant Funding**

**<u>Only</u> DHS-certified, *<u>comprehensive,</u>* Agroterrorism Preparedness Curriculum**

**New Funding (2007 – 2008)**

- **Continuation funding from DHS ($700,000, emphasis on nationwide training)**
- **Subcontract with Eastern Kentucky University ($250,000, part of their $11 million)**
- **Contract with Food & Drug Administration ($300,000/year for three years, emphasis on training feed and food regulatory agencies to form teams with FDA to develop response teams).**
- **GOHS funds to finish training in California communities**

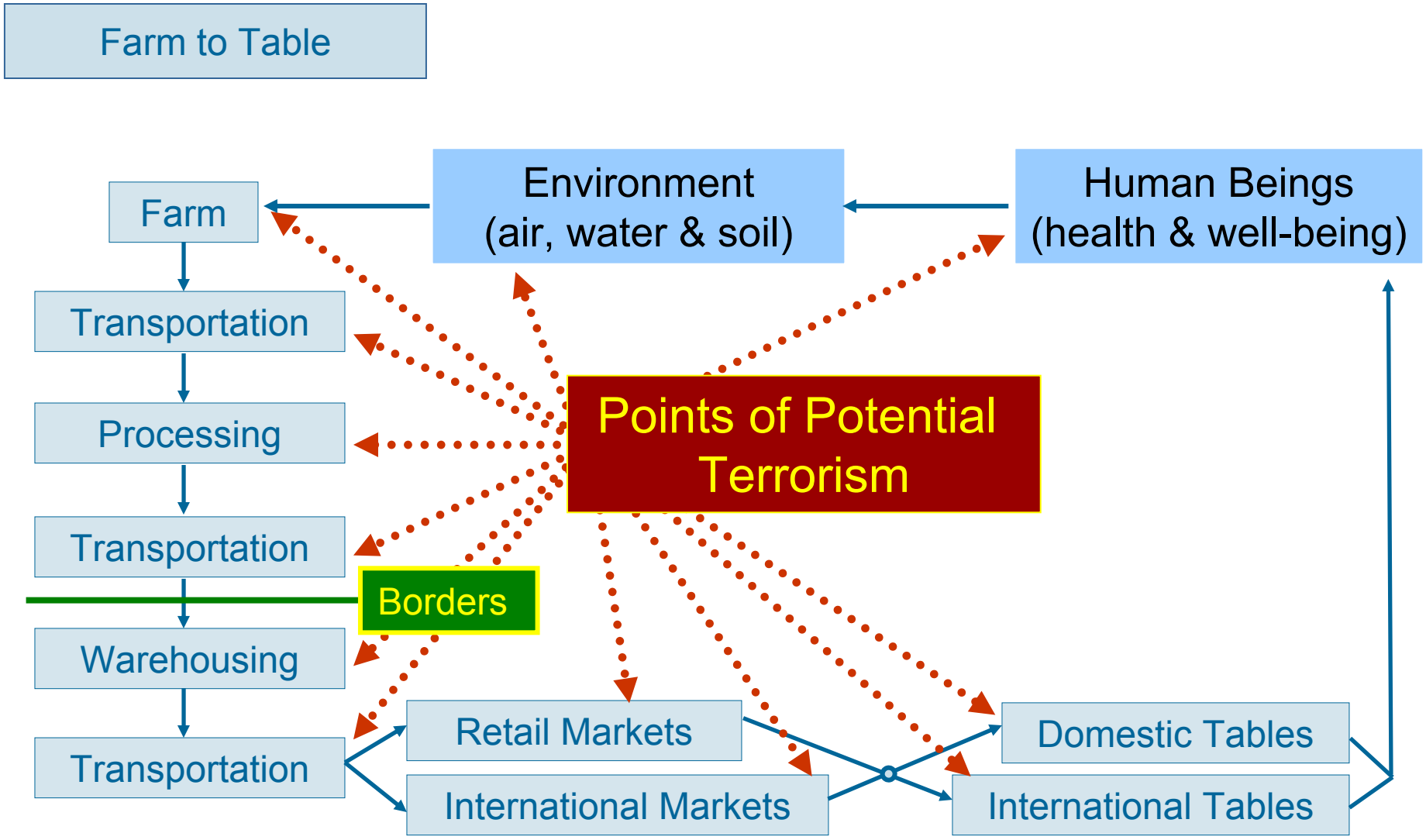
**Pending:**

- **CDFA/GOHS Exploration of risks at California land, sea, and air, ports**

# Overall WIFSS Curriculum Goal

- Help communities prepare teams of frontline responders for agroterrorism or food systems incidents
- Prepared to prevent/mitigate, detect, respond to, and recover from terrorist attacks on the food system
- *Comprehensive, All-Hazards Approach*
  - *Agroterrorism event*
  - *Food systems disaster*
  - *Food/water disruption in natural disasters*

# A new food continuum



# Agroterrorism

- Many different plant or animal pathogens can cause damage or loss of production
- Some pathogens cause disease (death) in both humans and animals (zoonotic diseases)
- Food or water can carry diseases, poisons and toxins to people, causing illness or death
- All agroterrorism will cause
  - significant psychological impact
  - economic disruption

# Biological

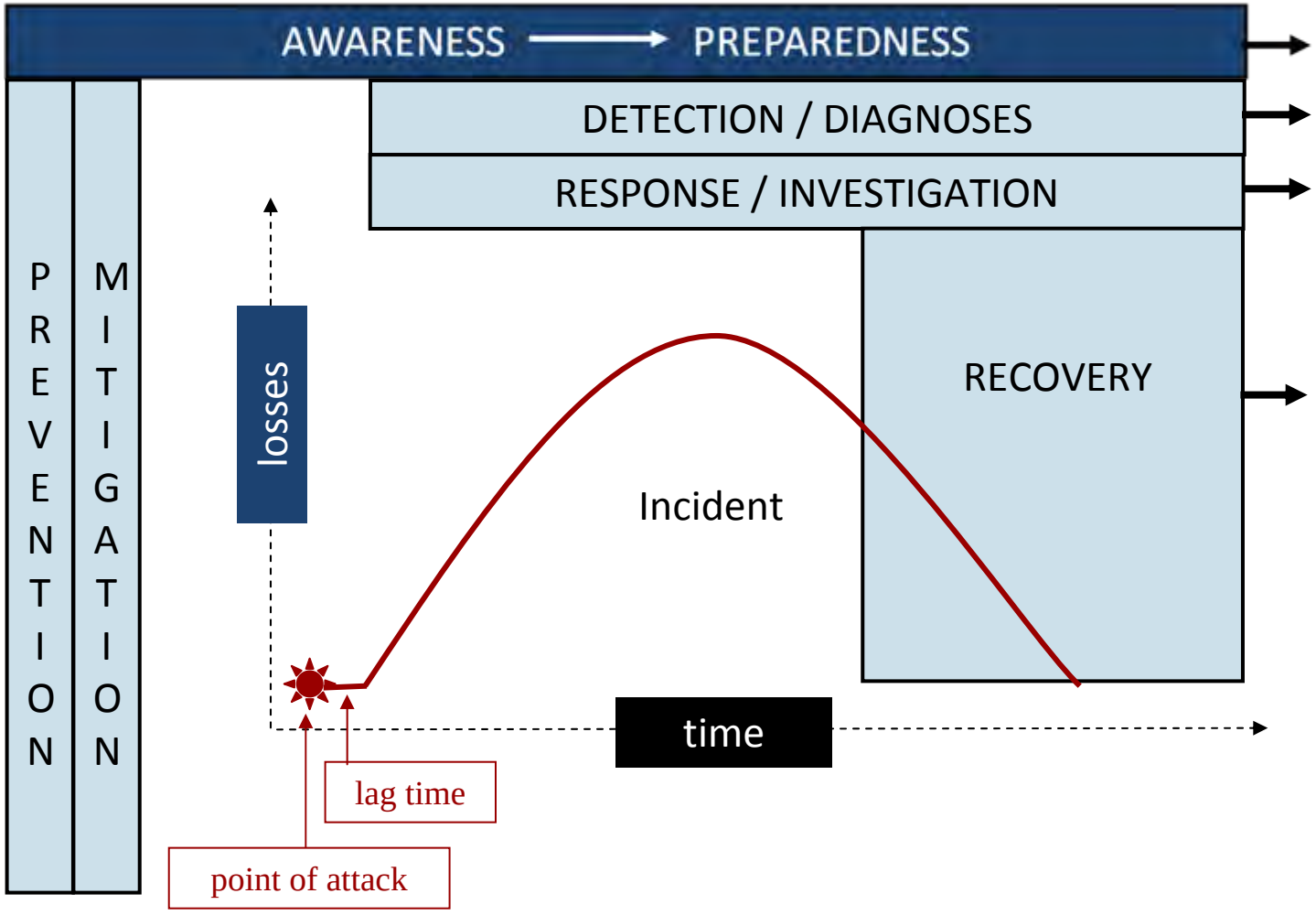
- Prions **(mad cow disease or Bovine Spongiform Encephalopathy (BSE))**
- Bacterial pathogens
- Viral pathogens
- Fungal pathogens
- Parasitic pathogens
- Biologically produced toxins
- Genetically modified organisms

# CDC Category A Agents

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum* toxin)
- Plague (*Yersinia pestis*)
- Smallpox (*Variola major*)
- Tularemia (*Francisella tularensis*)
- Viral hemorrhagic fevers (Ebola, Marburg, Lassa, Machupo)

*Anthrax, tularemia, plague and botulinum toxin are especially well suited for use in agroterrorism.*

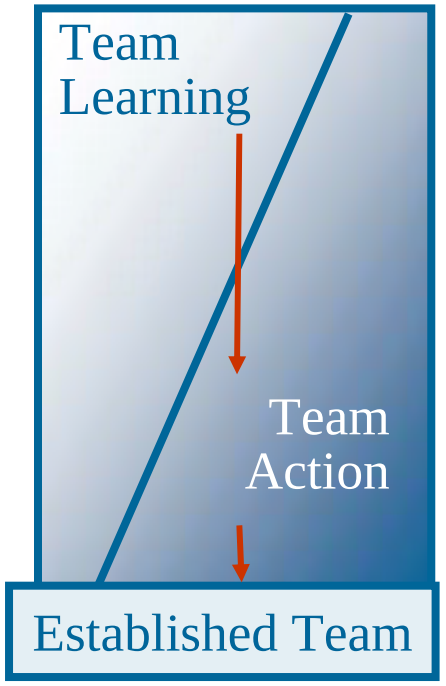
# The Steps to Preparedness



# WIFSS Agroterrorism Preparedness Curriculum for Frontline Responders

## Courses:

- ***Understanding the Dangers***
- ***Principles of Preparedness***
- ***Principles of Detection and Diagnosis***
- ***Principles of NIMS, Team Building and Risk Communication***
- ***Principles of Frontline Response***
- ***Principles of Recovery***



# WIFSS Curriculum, *cont.*

- **Enrichment Courses**—a series of courses to enhance depth of knowledge and capacity in specific areas:
  - ***Threats of Foreign Animal and Plant Diseases***
  - ***Risk Assessment Tools for Communities***
  - ***Foot and Mouth Disease***
  - ***Understanding the Food Systems and How They Work***
  - ***Avian Influenza***
  - ***Building Teams Across Disciplines***
  - Others as required

√ Performance testing exercises

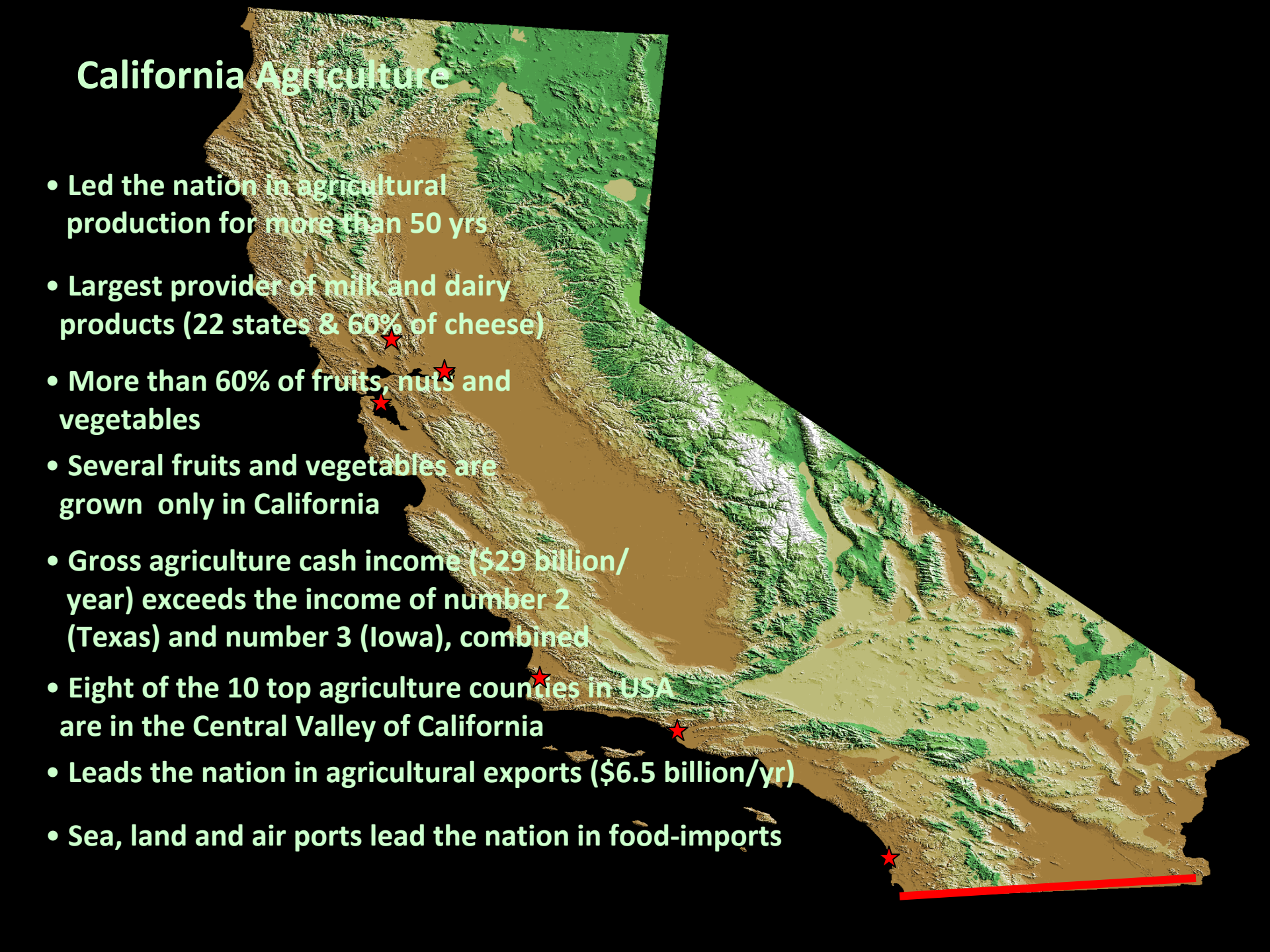
# Frontline Responders

- Includes community members:
  - Local emergency teams
  - Law enforcement
  - Fire services
  - Hazmat
  - Representatives of the food and agriculture industry
  - Community leaders (private and public)
  - Local public/environmental health groups
  - Local political leadership and designated agencies
  - Designated communication authorities/agencies
  - Education leaders
  - Health care providers (physicians, veterinarians, others)
- **Everyone with a legitimate role in agroterrorism response**

# Emphasis on Frontline Responders Training and Connection

Training takes place locally, but emphasizes integration with state and federal emergency response systems

# California Agriculture

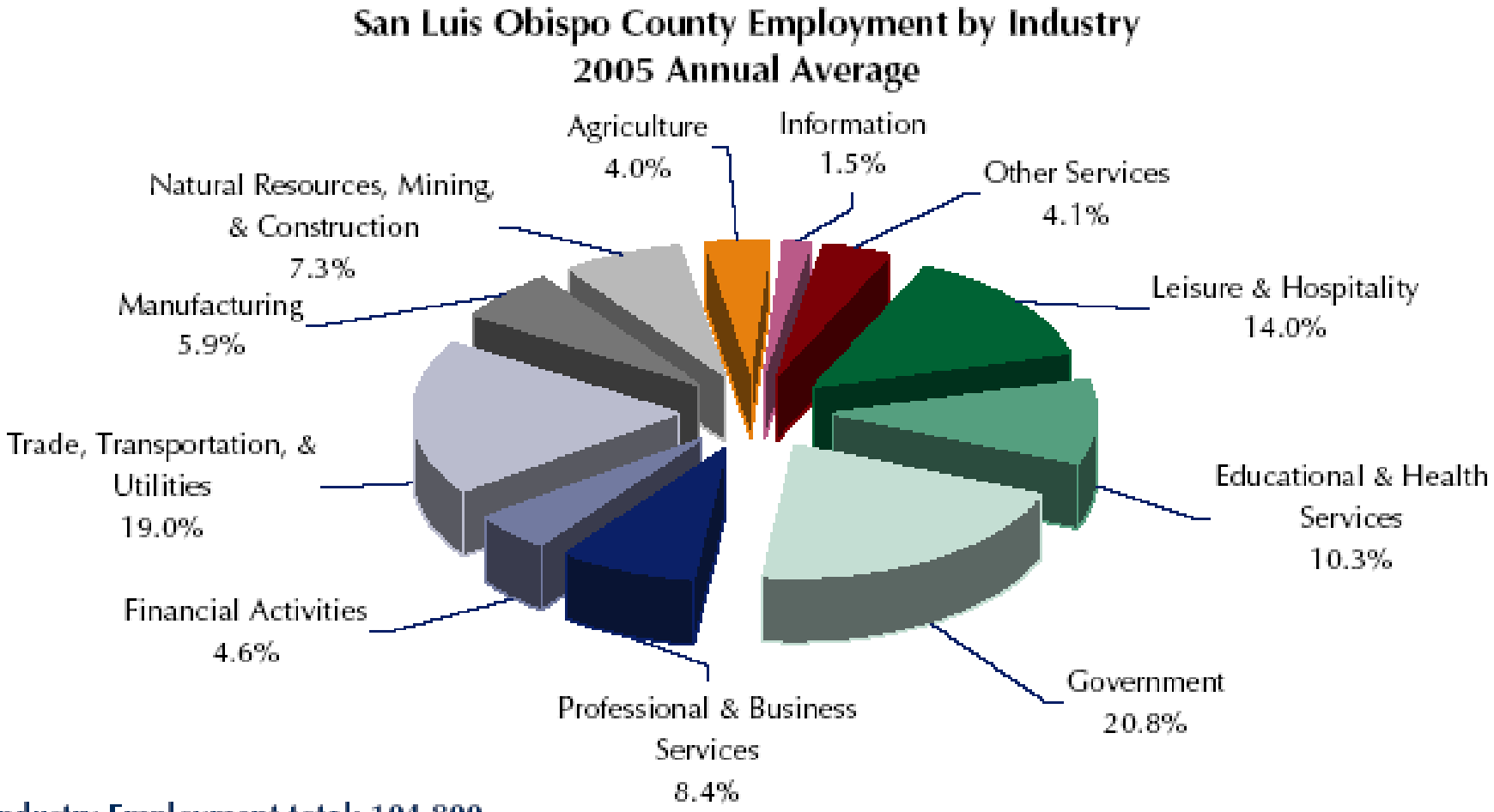


- Led the nation in agricultural production for more than 50 yrs
- Largest provider of milk and dairy products (22 states & 60% of cheese)
- More than 60% of fruits, nuts and vegetables
- Several fruits and vegetables are grown only in California
- Gross agriculture cash income ($29 billion/ year) exceeds the income of number 2 (Texas) and number 3 (Iowa), combined
- Eight of the 10 top agriculture counties in USA are in the Central Valley of California
- Leads the nation in agricultural exports ($6.5 billion/yr)
- Sea, land and air ports lead the nation in food-imports

# San Luis Obispo County Agriculture

| Commodity | Value |
|---|---|
| Wine Grapes | $ 194,373,000 |
| Cattle and Calves | 53,071,000 |
| Broccoli | 50,062,000 |
| Vegetable Transplants | 30,178,000 |
| Strawberries | 29,367,000 |
| Cut Flowers | 28,240,000 |
| Indoor Decoratives | 25,168,000 |
| Head Lettuce | 23,178,000 |
| Oriental Vegetables | 15,741,000 |
| Leaf Lettuce | 14,755,000 |
| GRAND TOTAL (All Crops) | $ 596,753,000 |

# San Luis Obispo County Agriculture



# WIFSS Agroterrorism Preparedness Curriculum County/Community Training

- Alameda
- Butte
- Contra Costa
- El Dorado
- Fresno
- Glenn
- Humboldt
- Imperial
- Inyo
- Kern
- Kings
- Lake
- Lassen
- Marin
- Mendocino
- Modoc
- Mono
- Monterey
- Orange
- Sacramento
- San Benito
- San Diego
- San Joaquin
- San Luis Obispo
- San Mateo
- Santa Clara
- Shasta
- Sonoma
- Sutter
- Stanislaus
- Tehama
- Tulare
- Yolo

# WIFSS Curriculum Training, *cont.*

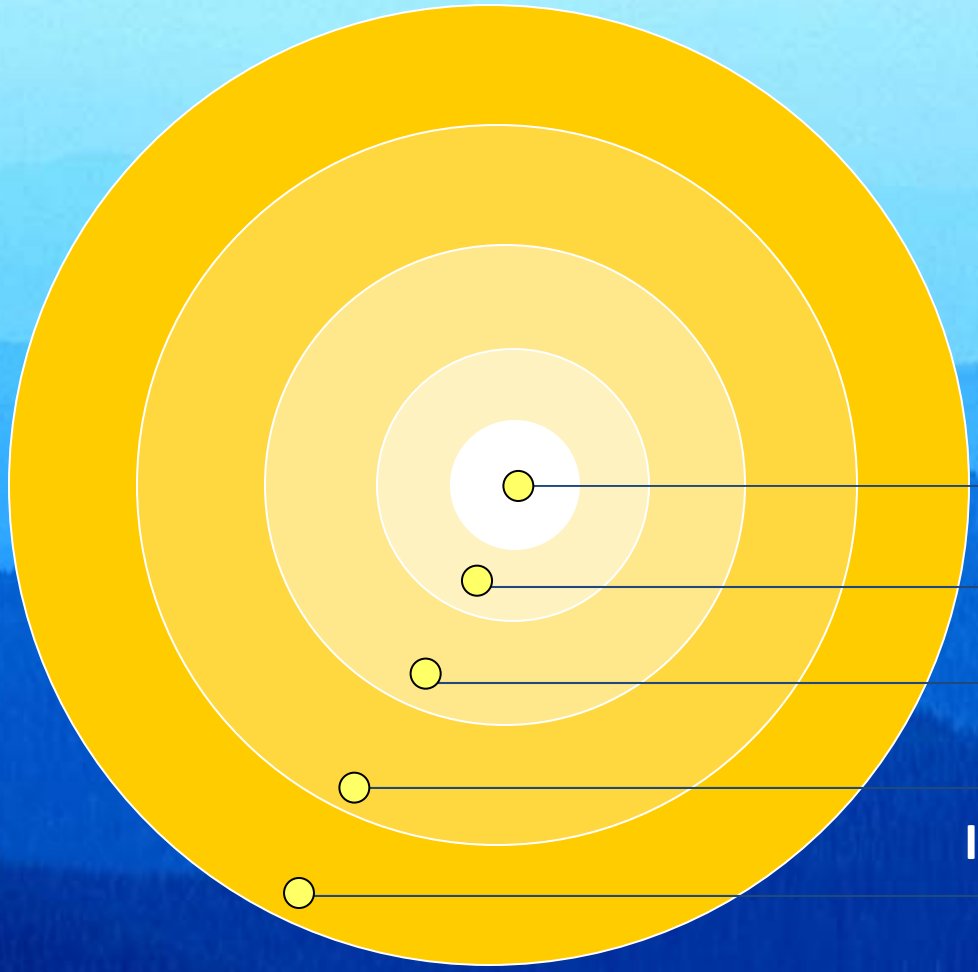
Other States:

- Arizona
- Connecticut
- Illinois
- Iowa
- Michigan
- Nevada
- New Mexico
- New York
- North Carolina
- Oregon
- Washington
- Wisconsin

Supplemental lectures/exercises:

EXAMPLES:

- State emergency response teams
- Food system associations
  - Commodity groups
  - Grocery associations
  - Restaurant associations
- Specific food/agriculture companies
- Governmental agencies
- Civic organizations
- Port authorities and companies
- Educational entities/associations



Individual

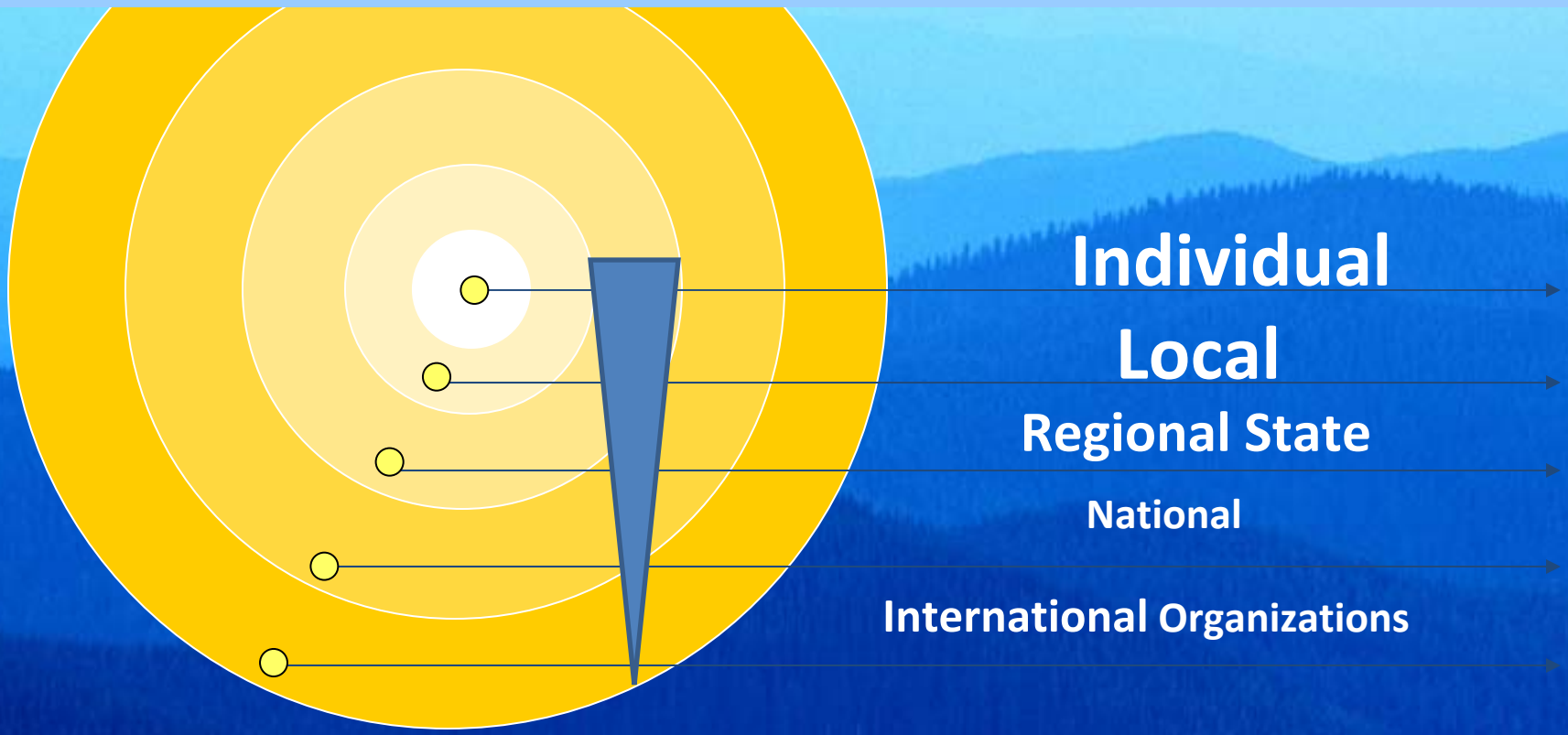
Local

Regional State

National

International Organizations

**In high-production states (e.g., California); the vital early response will need to be by individuals and local organizations. Coordination with state and federal agencies will follow.**



DIVERSITY
RESOURCE ADEQUACY
CHANGE
SUFFICIENCY
FOOD SAFETY
& DEFENSE
COMPLEXITY
GLOBAL
AFFORDABILITY
EXPOSED

# Thank you!

**Questions?**

**http://WIFSS.ucdavis.edu**

**email**
**Dr. Jerry Gillespie**
jrgillespie@wifss.ucdavis.edu

# Explosives Trace Detection

**Susan F. Hallowell, Ph.D.**
**Director, Transportation Security Laboratory**
**Science and Technology Directorate**
**U. S. Department of Homeland Security**

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# Explosives and Weapons Detection ‘Bulk and Trace’ Programs

← Bulk →

← Trace →

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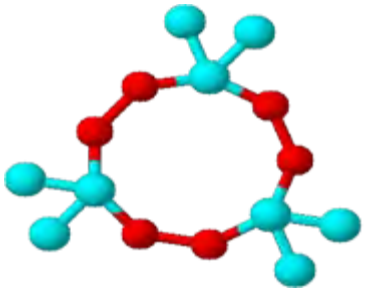
# Trace Detection

- Can be solid (particulate) or gas (vapor) phase.
  - ppm, ppb, or even ppt
- Identifies explicit composition



TATP

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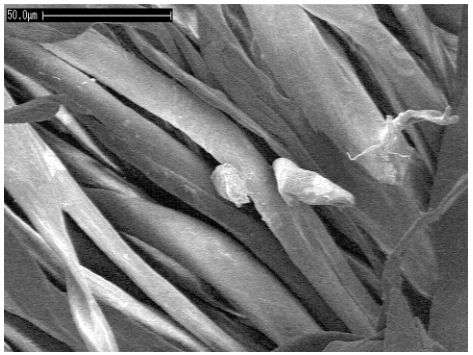
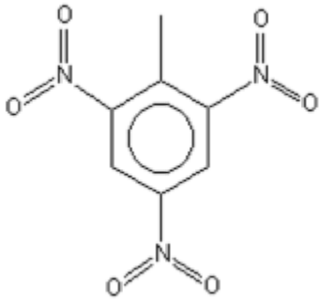
# Explosives Detection Overview
## ***Trace Detection*** – Chemistry Approaches




C-4 particle on cloth at 400X

Vapor signature



Vapor molecule of TNT

- Detection of trace (<ng/ppb) levels of explosive particles *and* vapors resulting from contamination

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# Trace Detection - What are we finding?

- 1-100 Nanogram of residue
- On the Concealment (BOMB)
- On the Latches, Handles, etc (bags, cargo, vehicles, people, ...)
- On the Interior of the Surfaces
- On the Exterior of the Surfaces

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# Where does the Traces of Explosives Come From ?

- Contact with the Bulk Explosive
- Aerosolized Explosive
- Secondary Fingerprints
- Contact with Contaminated Hands (gloves)
- Contact with Surfaces - Tools & Workplace

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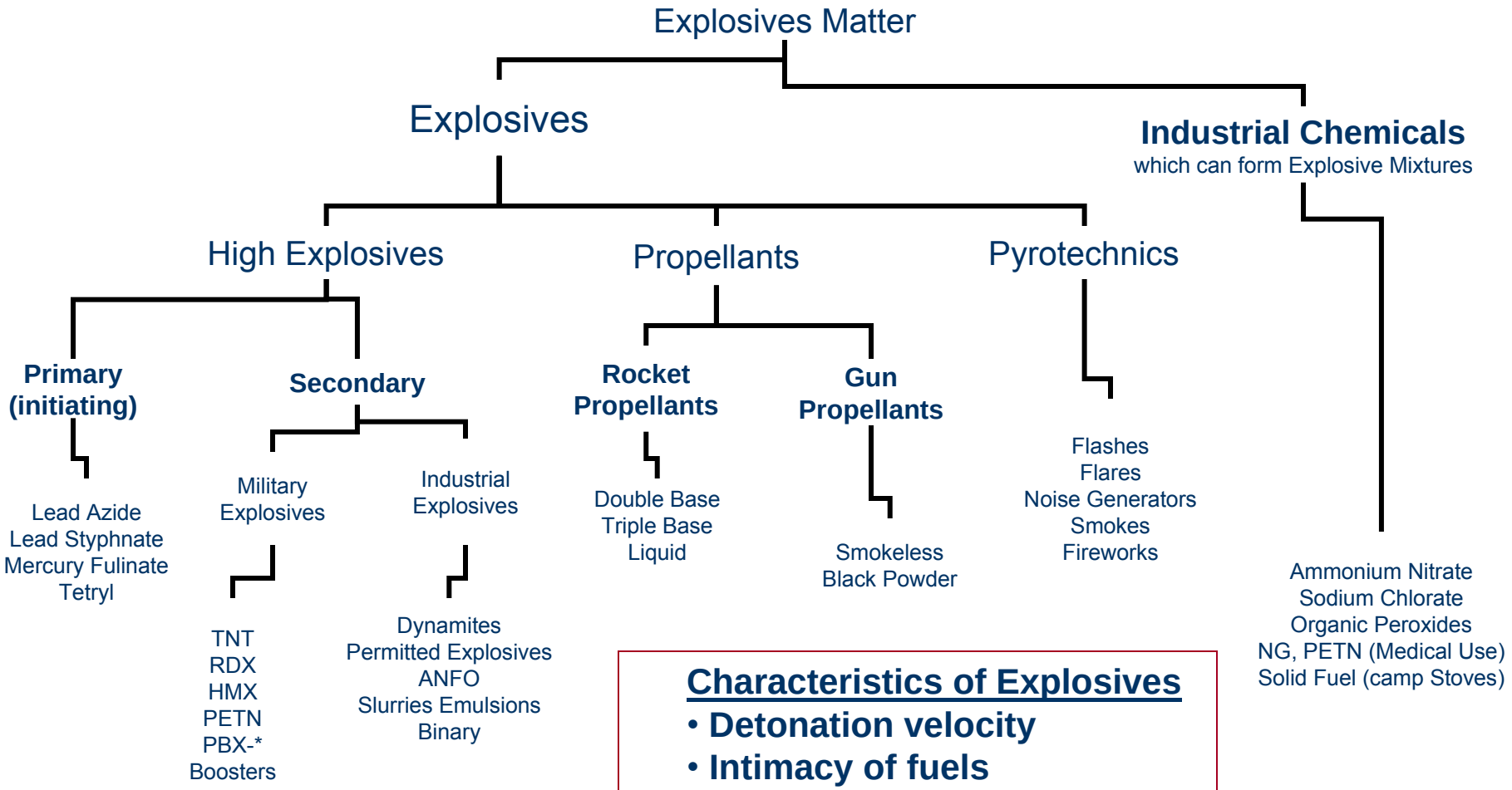
# Explosives Detection Overview
## Classification of Explosives




**Characteristics of Explosives**

- **Detonation velocity**
- **Intimacy of fuels**
- **Sensitivity to external stimuli**

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# Explosives

## Standard Explosives

- TNT
- RDX
- PETN
- Nitroglycerin (NG)
- Ethylene Glycol Dinitrate (EGDN)

## Plastic Explosives

- C-4 (RDX)
- Detasheet (PETN)
- Semtex (RDX + PETN)

## Improvised Explosives

- ANFO (Ammonium nitrate + fuel oil)
- Urea nitrate
- Triacetone triperoxide (TATP)

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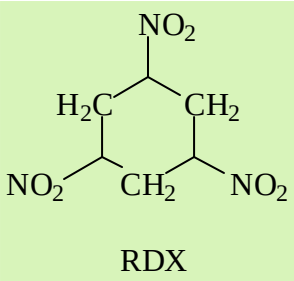
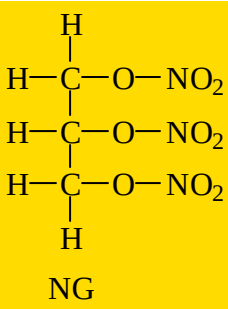
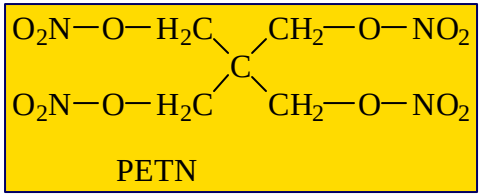
# Explosive Compounds



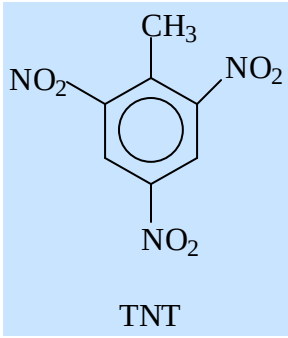
RDX



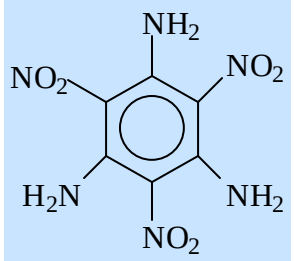
NG



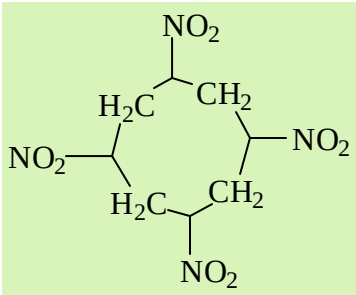
PETN



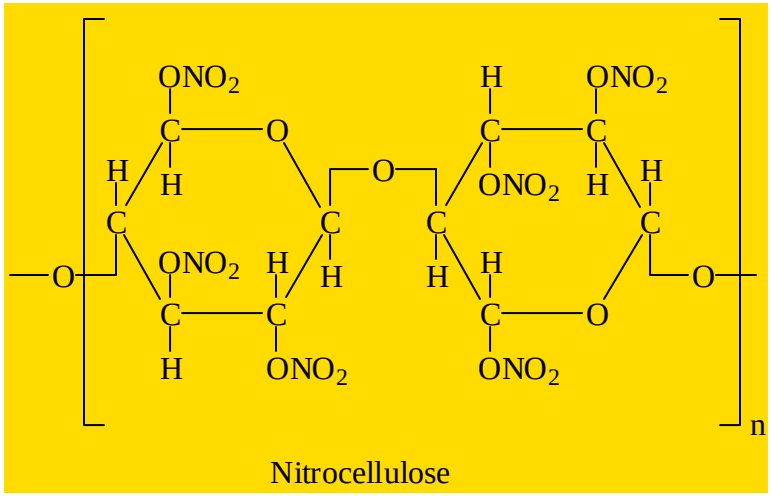
TNT



TATB



HMX



Nitrocellulose

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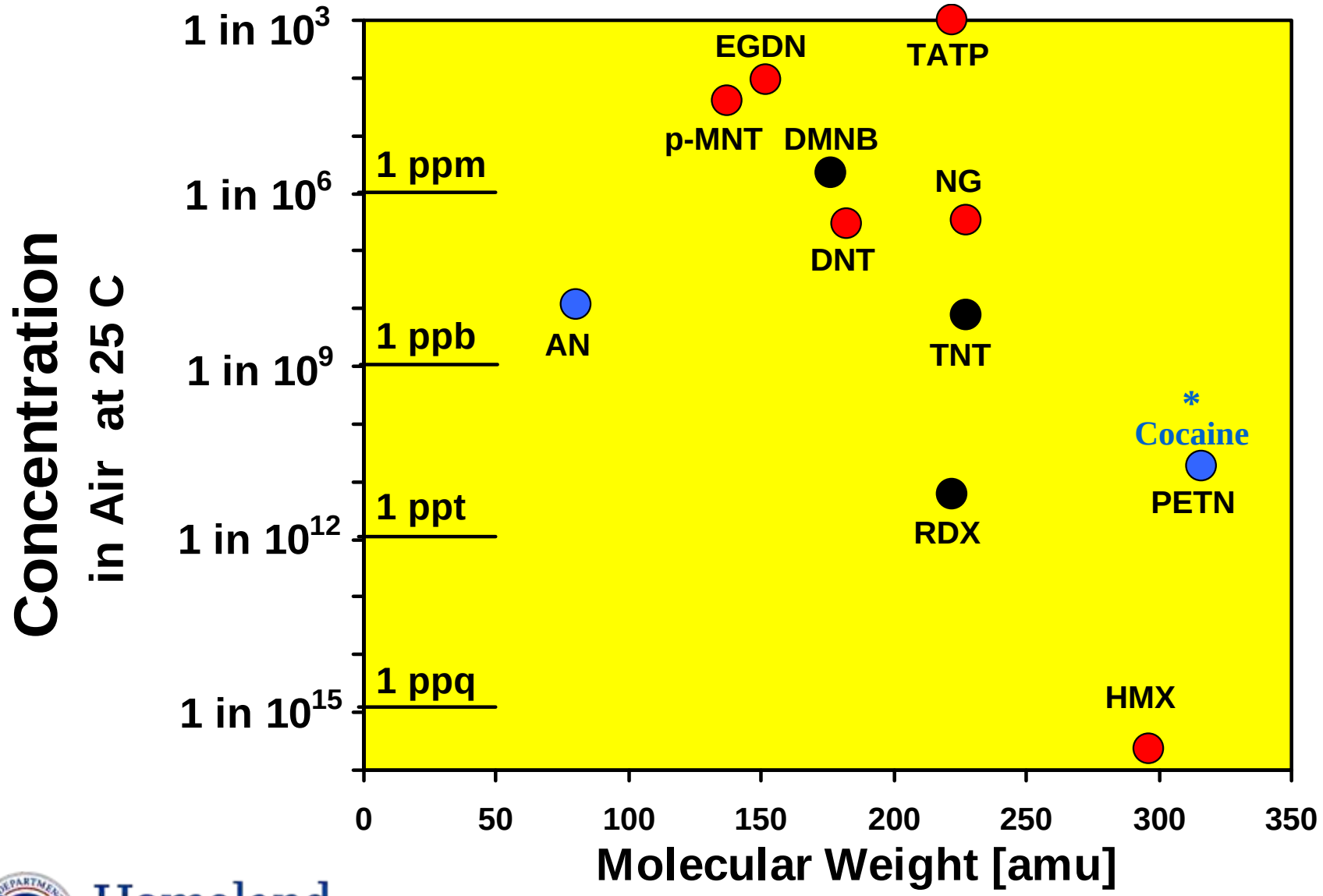
# Vapor Pressure, at Room Temperature . . .

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*Ref: US DOE study . . .*

# Trace Detection: Three processes

- Collect - the sampling process…Front-end collection / preconcentration…
- Separate - provides selectivity of threat…
- Detect - provides sensitivity for the threats of interest…

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# Particle vs. Vapor Sampling

- Most threats only provide spread via particles…
  * exceptions - newer homemade threats…

- Particle - hard, solid surfaces; contact swiping
  - soft surfaces, air jet or vac. sampling

- Vapor - High and low volume air collection.

- Today - need for both, simultaneous…

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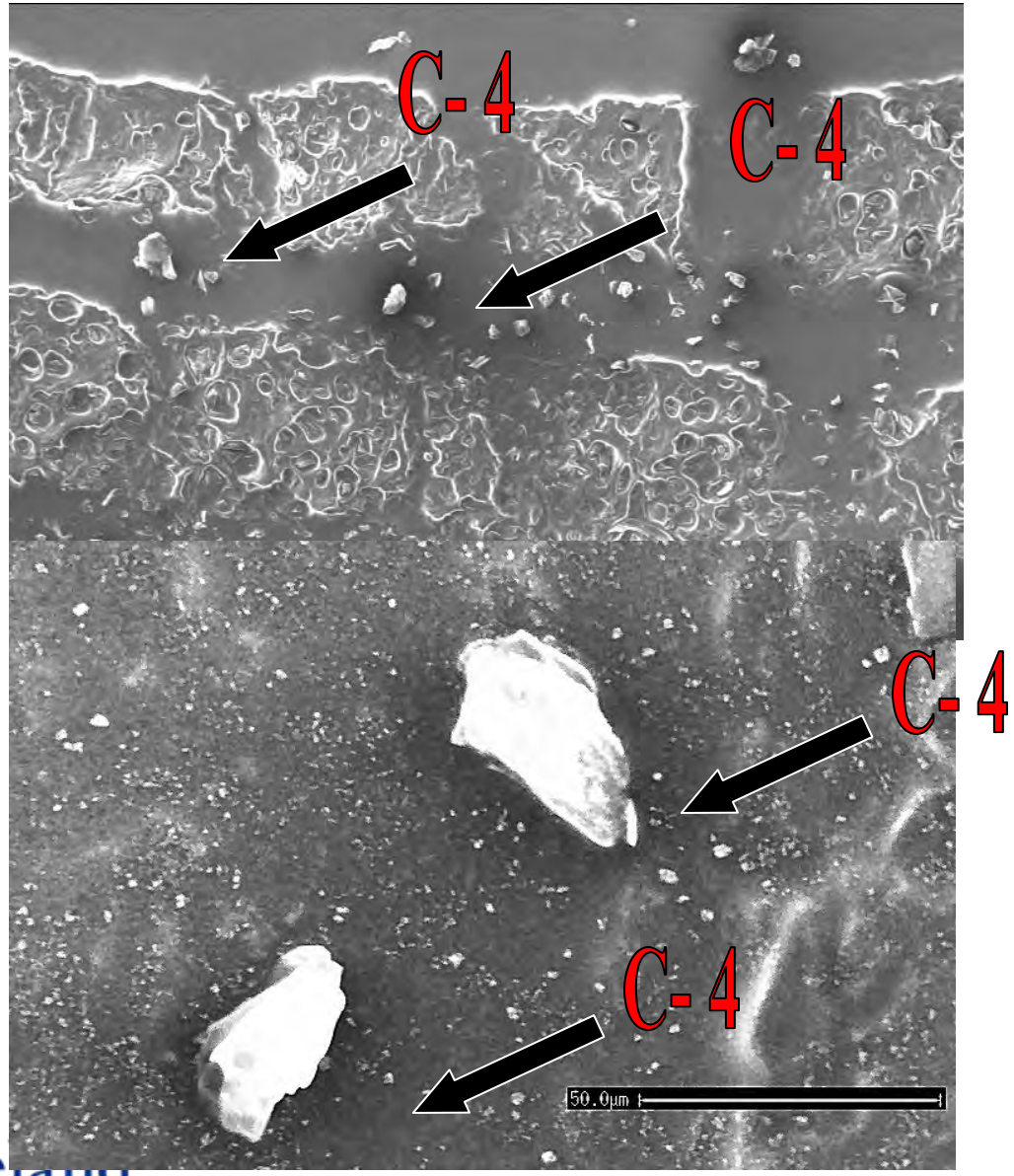
# C-4 Fingerprint

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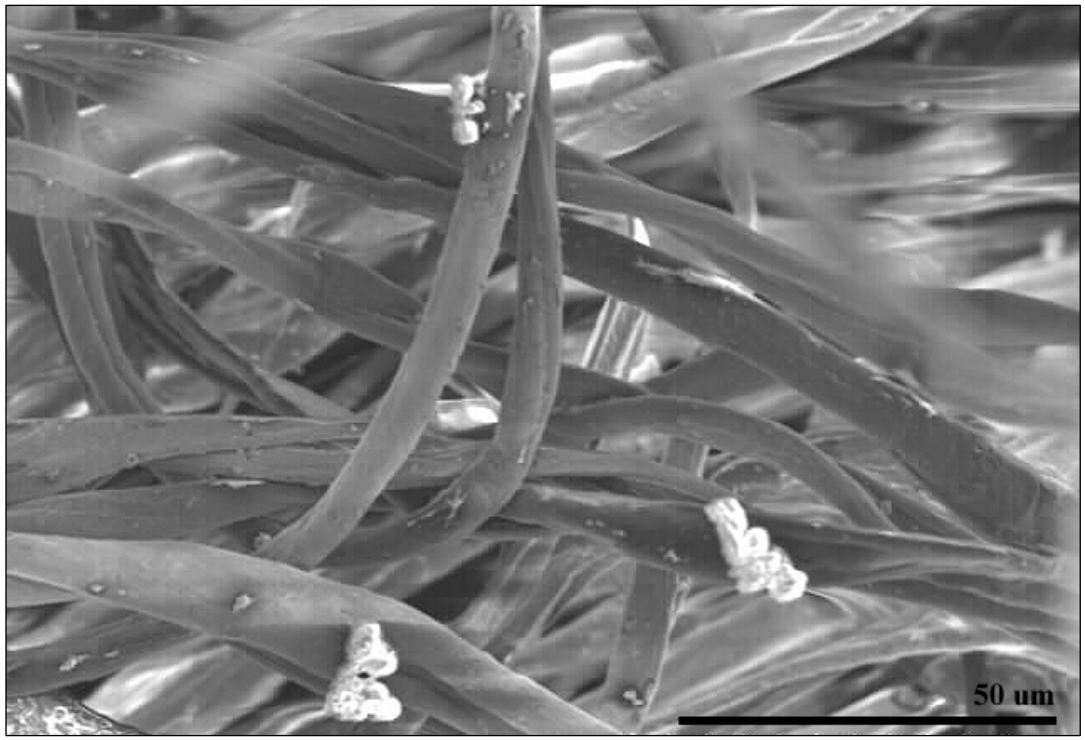
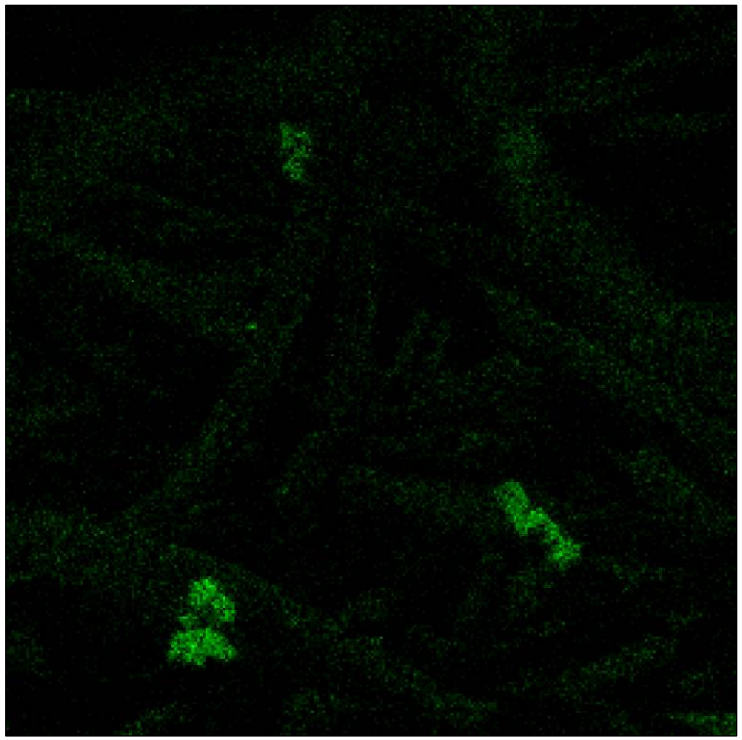
# X-RAY MAPPING OF C-4




SEM of C-4 on Muslin



X-ray Nitrogen Map

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# Particle Sampling

- How to remove from surfaces;

- First, need to know physical and chemical properties of the threat of interest … particle size, stickiness, binding forces, vapor pressure, etc.

- Sample Swiping method - efficiency of collection; careful selection of material, collection via hand wiping or sampling wand, area per collection and pressure to be applied, etc.

.

-Enviromental effects; dry vs. wet surface (vs. type of sample swipe), clean vs. dirty surfaces, etc.

*Reference herein to any specific commercial products, processes, equipment, or services does not constitute or imply its endorsement, recommendation, or favoring by the United States Government or the Department of Homeland Security (DHS), or any of its employees or contractors.*

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# Commercial Trace Sampling Wands

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# Explosives Detection Overview

## ***Trace Detection*** – Deployed Particle Equipment

**Smiths Detection**

**IonScan 400B**

**GE-Ion Track**

**Itemiser$^2$**

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# Vapor Sampling

- How to collect from surfaces;
- First, need to know physical and chemical properties of the threat of interest … vapor pressure, sublimation rate, etc. --------->>>
- Sample method - efficiency of collection; careful selection of collection via low volume or high volume sampling, distance to suspect item critical, etc.
-Enviromental effects; temperature (range of temp), clean vs dirty surfaces (amount of other non-threat vapor), etc.

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# Sampling for Explosive Vapors

**Reynolds Averaged Navier-Stokes**

$$\frac{\partial U_i}{\partial x_i} = 0 \qquad \frac{\partial U_i}{\partial t} + U_j \frac{\partial U_i}{\partial x_j} = -\frac{\partial \hat{p}}{\partial x_i} + \frac{1}{Re}\frac{\partial^2 U_i}{\partial x_j \partial x_j} - \frac{\partial}{\partial x_j}\overline{u_i u_j} + \delta_{i3}\frac{Gr}{\mathrm{Re}^2}\Theta$$

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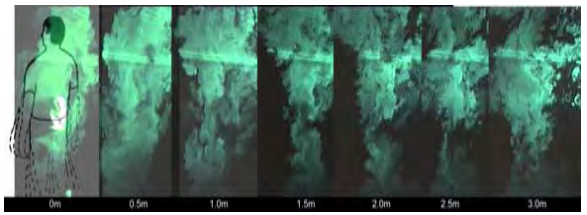

# Explosives Detection Overview
## ***Trace Detection*** – Vapor Detection Equipment

**GE – IonTrack**

**VaporTracer2**

**Smiths Detection**

**Sabre 4000**

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# Explosives Detection Overview
## ***Trace Detection*** – Whole Body Screening

**GE – IonTrack**

**EntryScan$^3$**

**Syagen**

**Guardian**

**Smiths Detection**

**Sentinel**

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# Explosives Detection Overview

## ***Trace Detection*** – Canines

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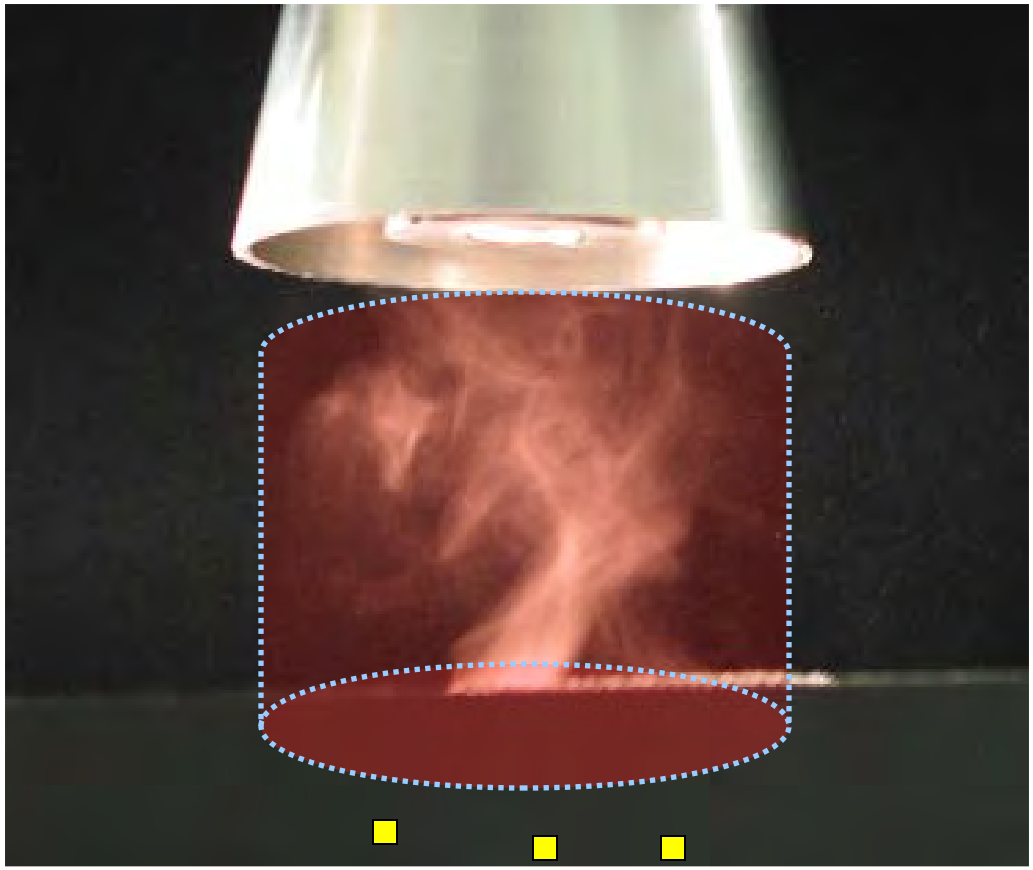
# Vortex Sampling System



**Axial cyclone with return flow designed to generate an artificial tornado and pick up vapors of explosive materials without physical contact with a surface.**

**Sampling distance is ½"-13½".**

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IMPLANT SCIENCES CORPORATION

# Trace Explosive Detection Technologies

- Electronic/Chemical: Picogram sensitivity
  - Ion Mobility Spectrometry : Widespread use:  Separates and Analyzes in seconds
  - Chemiluminescence: Extremely sensitive, need to separate explosives from other compounds
  - Electron Capture Detection:  Sensitive, but needs separation step
  - Surface Acoustic Wave: Trade off between specificity and sensitivity
  - Thermo-Redox: Sensitive, needs separation step
  - Mass Spectrometry: Requires high vacuum, is fragile but very sensitive
- Colorimetric (Chemical):  Sensitive only to micrograms to nanograms
- Biosensor
  - K-9s: Sensitive, versatile, must train to application
  - Antigen Antibody:  Very sensitive, but very specific

# Technology Requirements

- Meet Detection Specification for Sensitivity and Selectivity for Specified Threats.
- Very Low False Alarm Rate
- Very High Probability of Detection
- Minimal Decision Making by Human
- Automated
- Robust
- Can Be Operated by Screeners (Not the Ones That Have a Masters Degree in Physics)
- Not Too Expensive (ETD, consumables, etc.)
- Privacy Concerns Addressed

# Deployed Trace Detectors

- BARRINGER
  - Technology - Ion Mobility Spectrometry
  - Approved models - IonScan Models 400 and 400B
- IONTRACK
  - Technology - Ion Mobility Spectrometry
  - Approved models - Itemizer-DOS &  Itemizer-W
- THERMODETECTION
  - Technology - GC/Chemiluminescense
  - Approved models - EGIS Models 3000 & II

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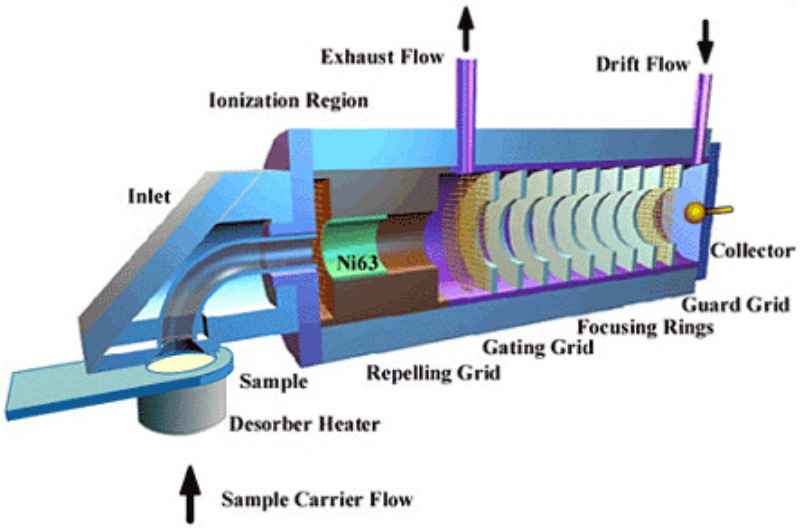
# ION MOBILITY SPECTROSCOPY (IMS)




- Substrate heated to vaporize particles
- Molecules are ionized by a weak radioactive source and drift through a weak electric field
- Particle time of flight is a distinct fingerprint, enabling detection

## Applications:

- Explosives detection on both luggage and people
- Detection of narcotics

## Technical Barriers:

- Dependent on screener sampling
- Susceptible to atmospheric changes
- Calibration requirements
- Saturation possible

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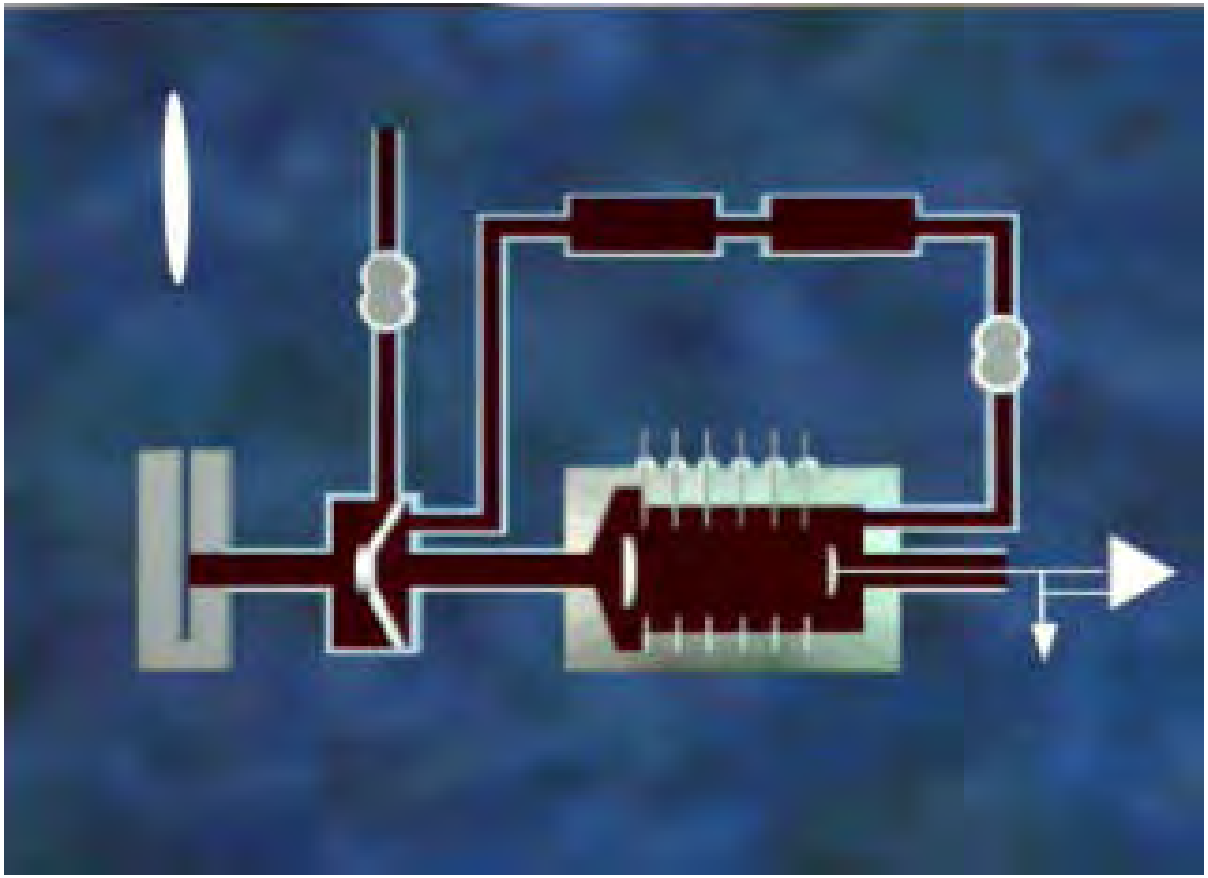
# ITMS Detector
# How It Works



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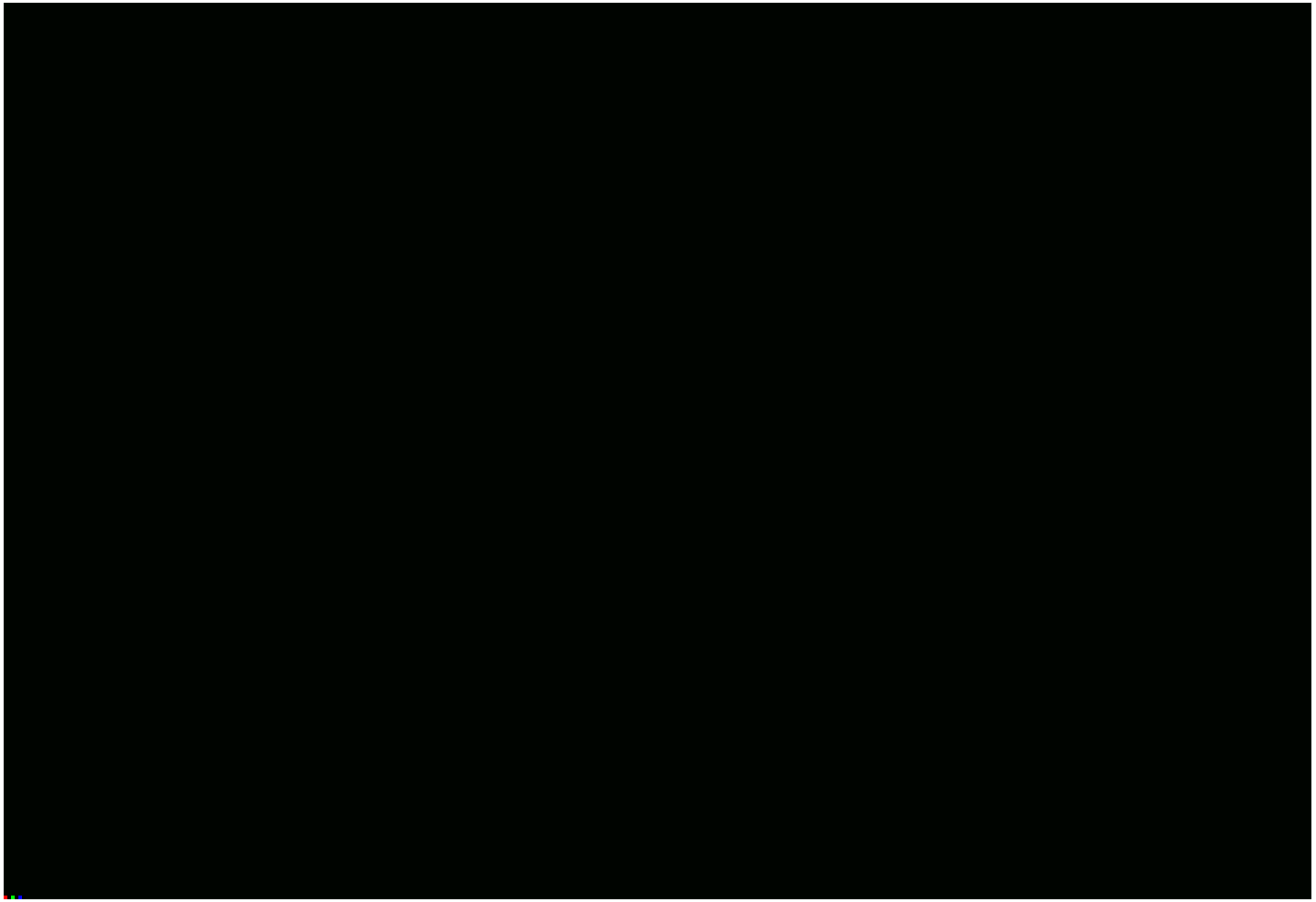
# Simultaneous, Dual-Mode Detector



# Challenges to Trace Detection

## Interferential Only

An alarm does not necessarily mean a bomb if sampling for particles but you need a good reason to be contaminated! **If you see vapor, YOU HAVE A BOMB!**

## Sampling

True vapor and particle sampler does not exist

Its about getting the sample!!

Currently highly dependent on skilled operator

## Selectivity/Sensitivity

- A wider range of threats (cross-applications) needs to be addressed and developed for Trace Detection, eg. Chemical agents, transparent Extremely sensitive explosive detectors exist, but ability to detect more compounds, lower false alarm rate needed.

- Operational alarm rates are “reasonable” for many of the current applications; but are prohibitively high in others.

# Explosive Trace Detectors
# The Future …

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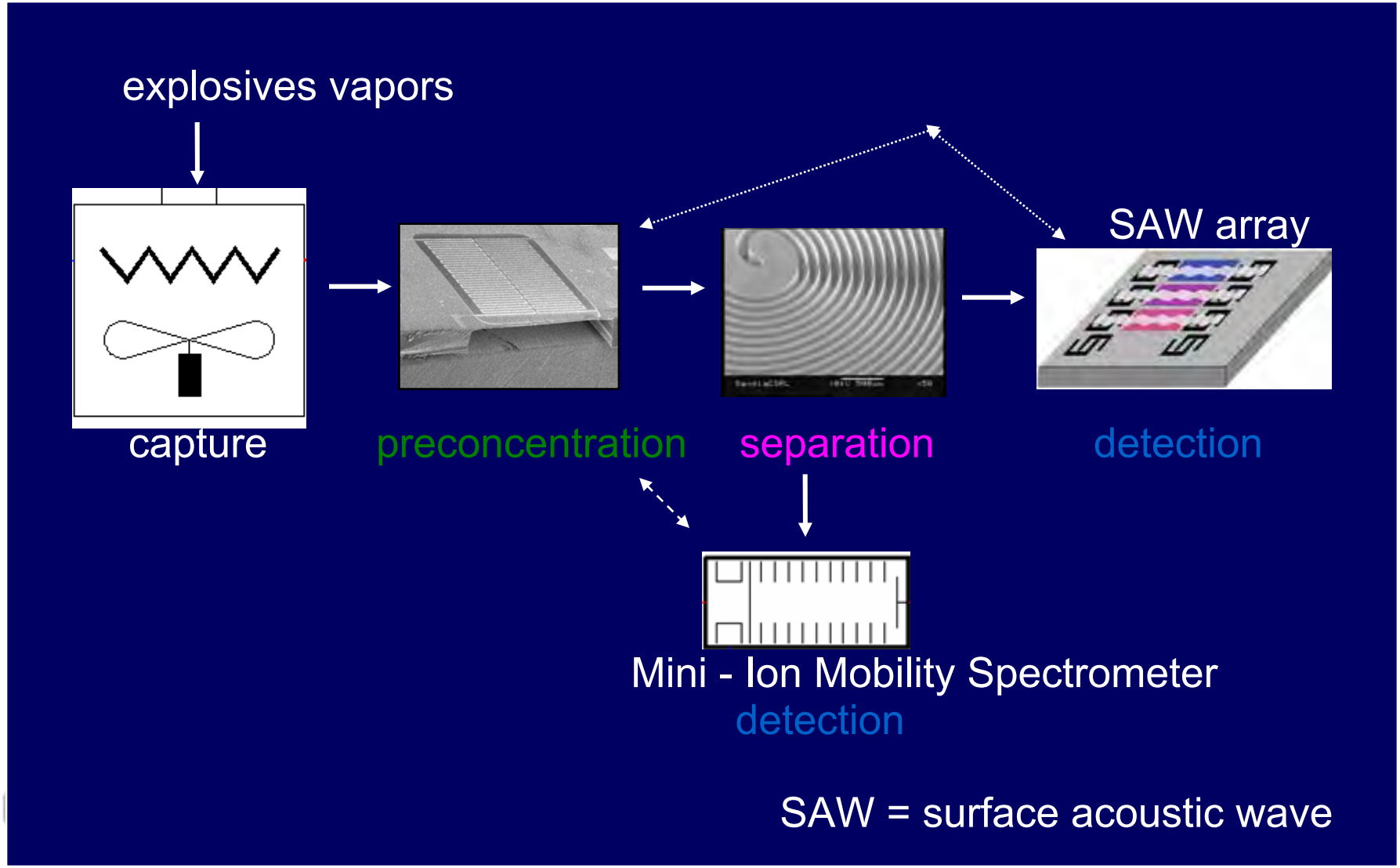
# Near – term ETD's . . .
# and improvements to sample collection . . .

# MicroHound III

# MicroHound™ Concept



# Microsensors

## Requirements for Detection of Explosives for First Responders

- Small and portable
- Specific to one or more explosives
- Array of Sensors – provides full threat coverage, and Improved alarm statistics.
- Sensitive (and Selective).
- Low cost

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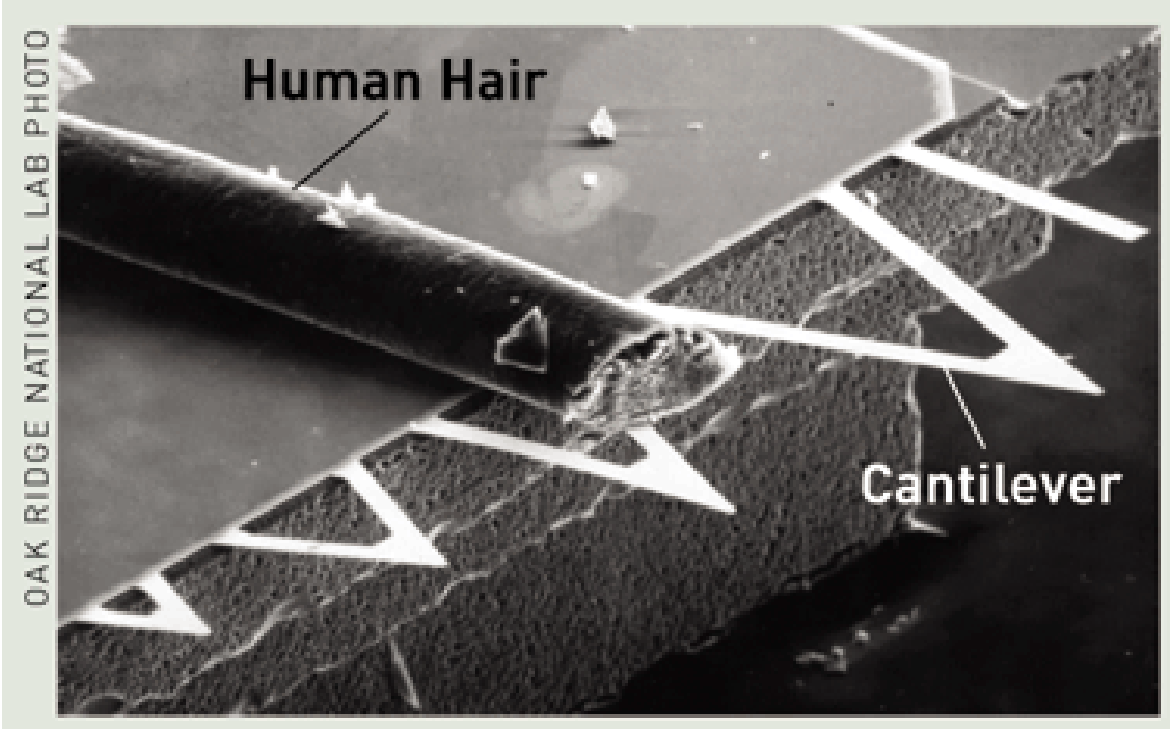
# Micro-electromechanical System (MEMS) Cantilever




*Ref: T. Thundat et al, ORNL*

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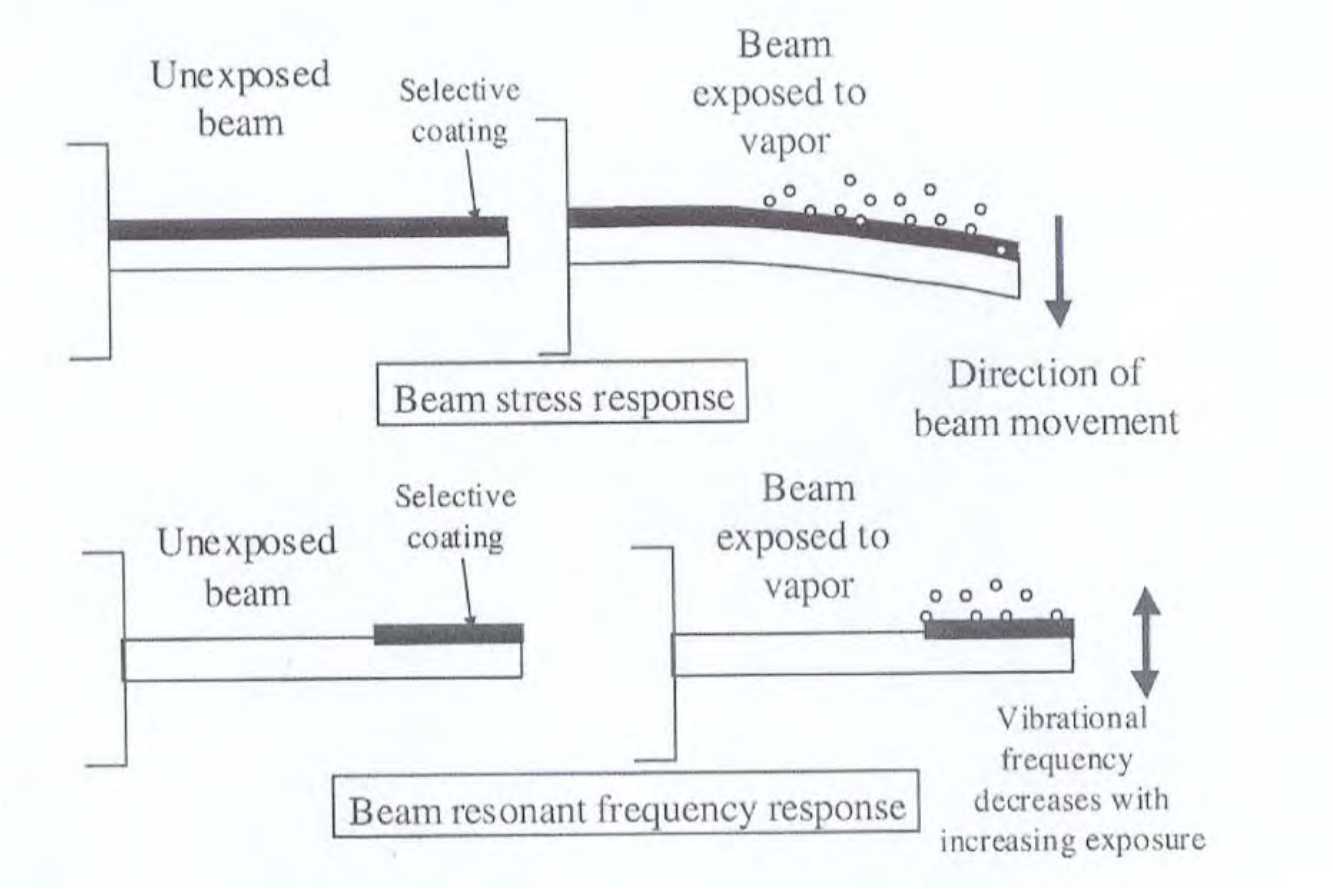
# Micro-electromechanical System (MEMS) Cantilever




*Ref: Coatings NRL & ORNL*

ATF /TSA uCantil. Progm.

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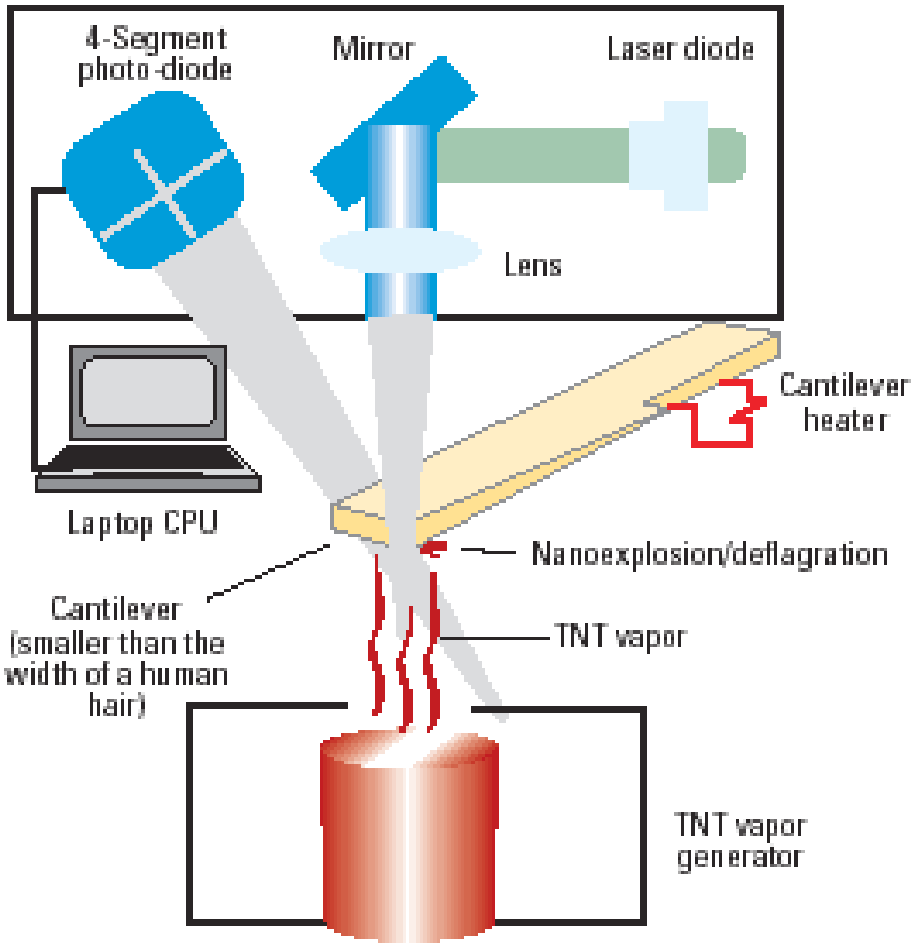
# Micro-electromechanical System (MEMS)

Is based on miniature micro-machined silicon cantilevers (a few hundred μm long and 1 μm thick) that can detect tiny forces caused by heat-induced nano-explosions. The silicon material absorbs the explosive vapor, which is heated and undergoes tiny explosions that are detected by an optical beam. Scanning the temperature of the cantilever allows detection of various explosives, according to their temperature of deflagration.

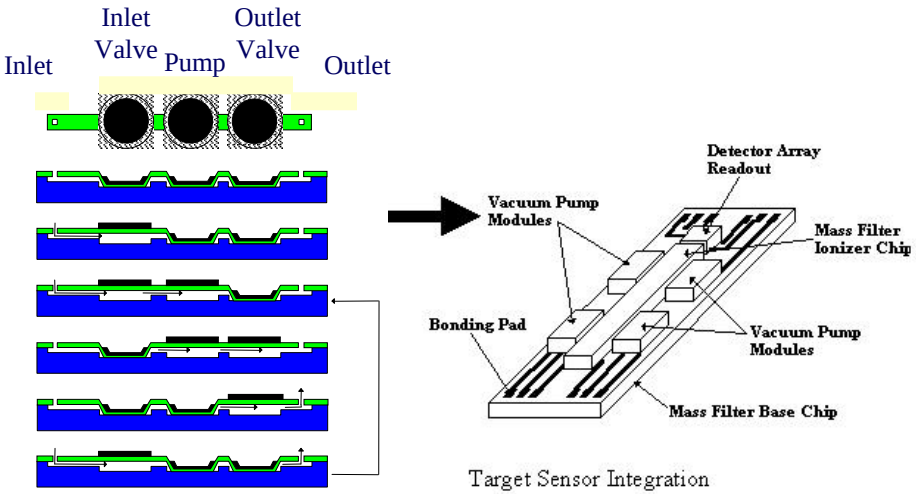
Sensitivity: 10-30 ppt of RDX and PETN (femtogram range)

## Cantilever detection system




T. Thundat et al., Ultramicroscopy, 97, 433, 2003

# Mass Spec on a Chip/MEMS



Target Sensor Integration

- R&D of a front end Chemical sensor for the MEMS based MS on a Chip (and support of MS development project).

MS on a Chip
- Partnership with NG/ARL/DARPA

- Report with evaluation of one type of front end chemical sensor (gas centrifuge separator).

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# What analyte is a detection dog signaling on?

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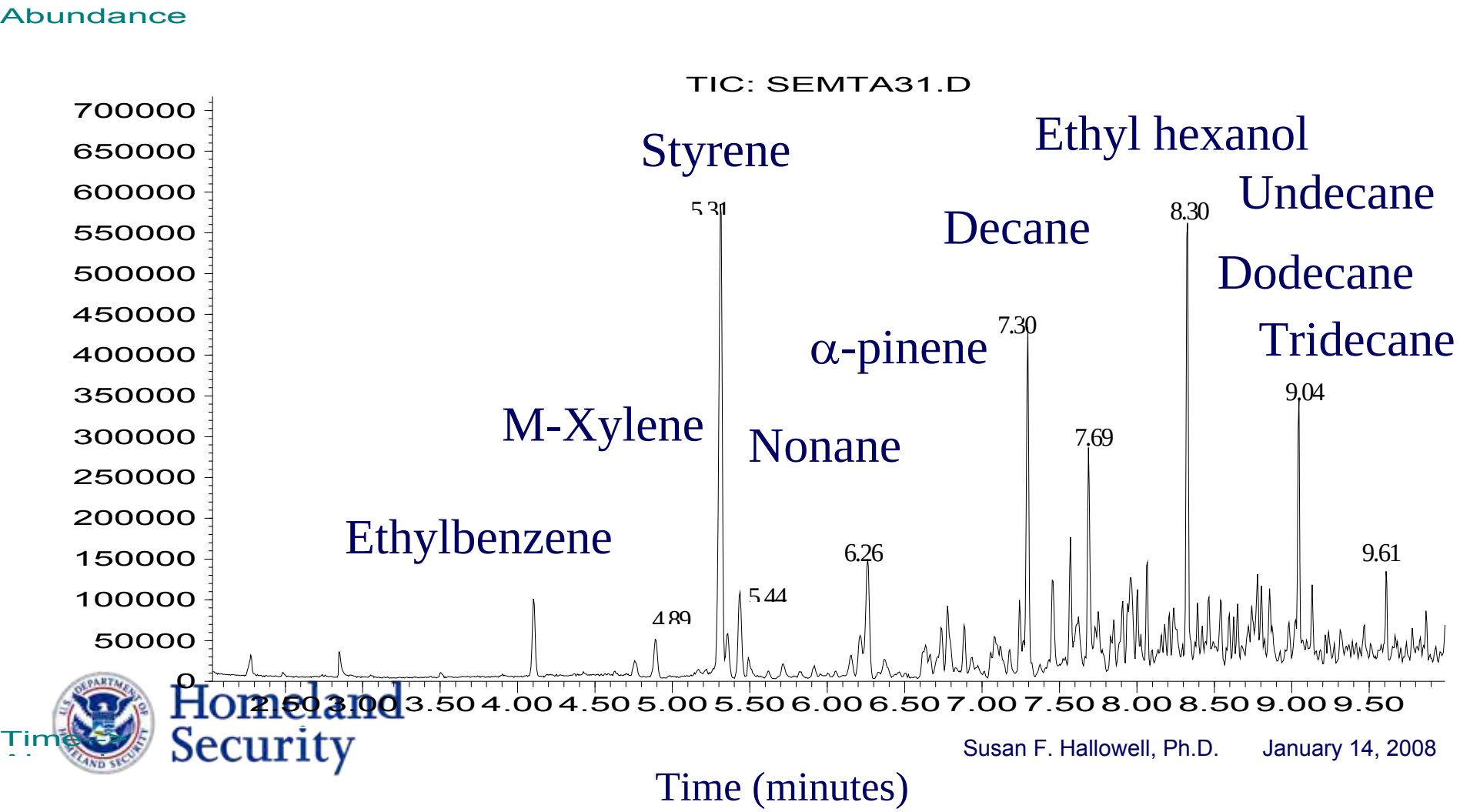
# Semtex H Headspace Analysis

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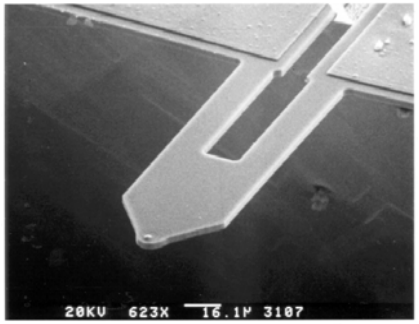
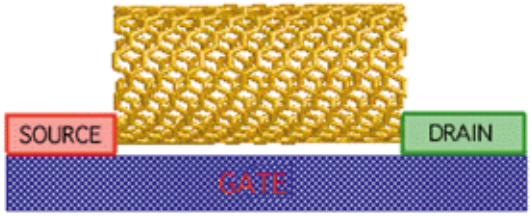
# The Future of Trace?

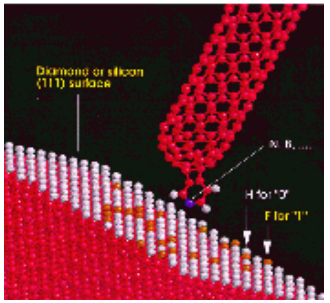
- **Automated Samplers:  The key is the front end!**
- **Trace Explosives and CW/BW Sensor Development, Metal Detection, etc.**
- **Embedded Detectors in containers/walls**
- **Nanotechnology:  sources and detectors**




**Nano detection on micro systems**




**CNT – nano explosives Det.**



**CNT – nano wire sensor**

***Effort with NASA Ames Research Cntr.***

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# Future Prospects

- **Novel Collection/Sampling Systems, New ETD's – including other technologies like MS, Spectroscopy (THz, CRDS, ...), etc.**
- **Microsensors/electronic noses – as Array Detectors.**
- **Nanotechnology will become the major driver for microsensors, and certainly a long-term future development.**

# Conclusions…

- **Today/Future - need to efficiently sample both vapor and particle at same time…**

  - **Automated - to eliminate or reduce human training and human ability to sample.**

  - **Non-contact (if possible) - to reduce interaction with surfaces and eliminate wiping of surfaces (manual sampling issues, cost of consumables, etc.).**

- **Ability to detect threats with Trace Explosive Detection is a combination of Sampling and Detection…both critical processes.**

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# Questions?

Susan F. Hallowell, Ph.D.
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# Explosives Trace Detection

**Susan Hallowell, Ph.D.**
**Director**
**Transportation Security Laboratory**
**Science and Technology Directorate**
**Department of Homeland Security**

***"Putting First Responders First"***

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Science & Technology

# Explosives and Weapons Detection ‘Bulk and Trace’ Programs

← Bulk →

← Trace →

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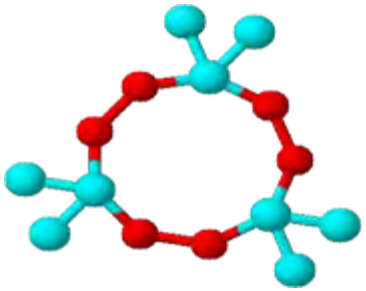
# Trace Detection

- Can be solid (particulate) or gas (vapor) phase.
  - ppm, ppb, or even ppt
- Identifies explicit composition



TATP

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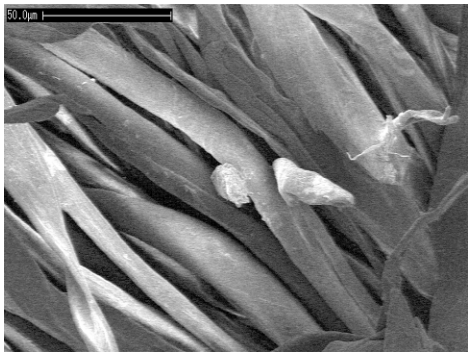
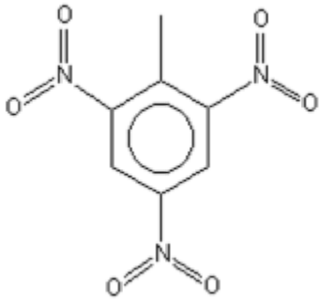
# Explosives Detection Overview
## ***Trace Detection*** – Chemistry Approaches




C-4 particle on cloth at 400X

Vapor signature



Vapor molecule of TNT

- Detection of trace (<ng/ppb) levels of explosive particles *and* vapors resulting from contamination

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# Trace Detection - What are we finding?

- 1-100 Nanogram of residue
- On the Concealment (BOMB)
- On the Latches, Handles, etc (bags, cargo, vehicles, people, ...)
- On the Interior of the Surfaces
- On the Exterior of the Surfaces

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# Where does the Traces of Explosives Come From ?

- Contact with the Bulk Explosive
- Aerosolized Explosive
- Secondary Fingerprints
- Contact with Contaminated Hands (gloves)
- Contact with Surfaces - Tools & Workplace

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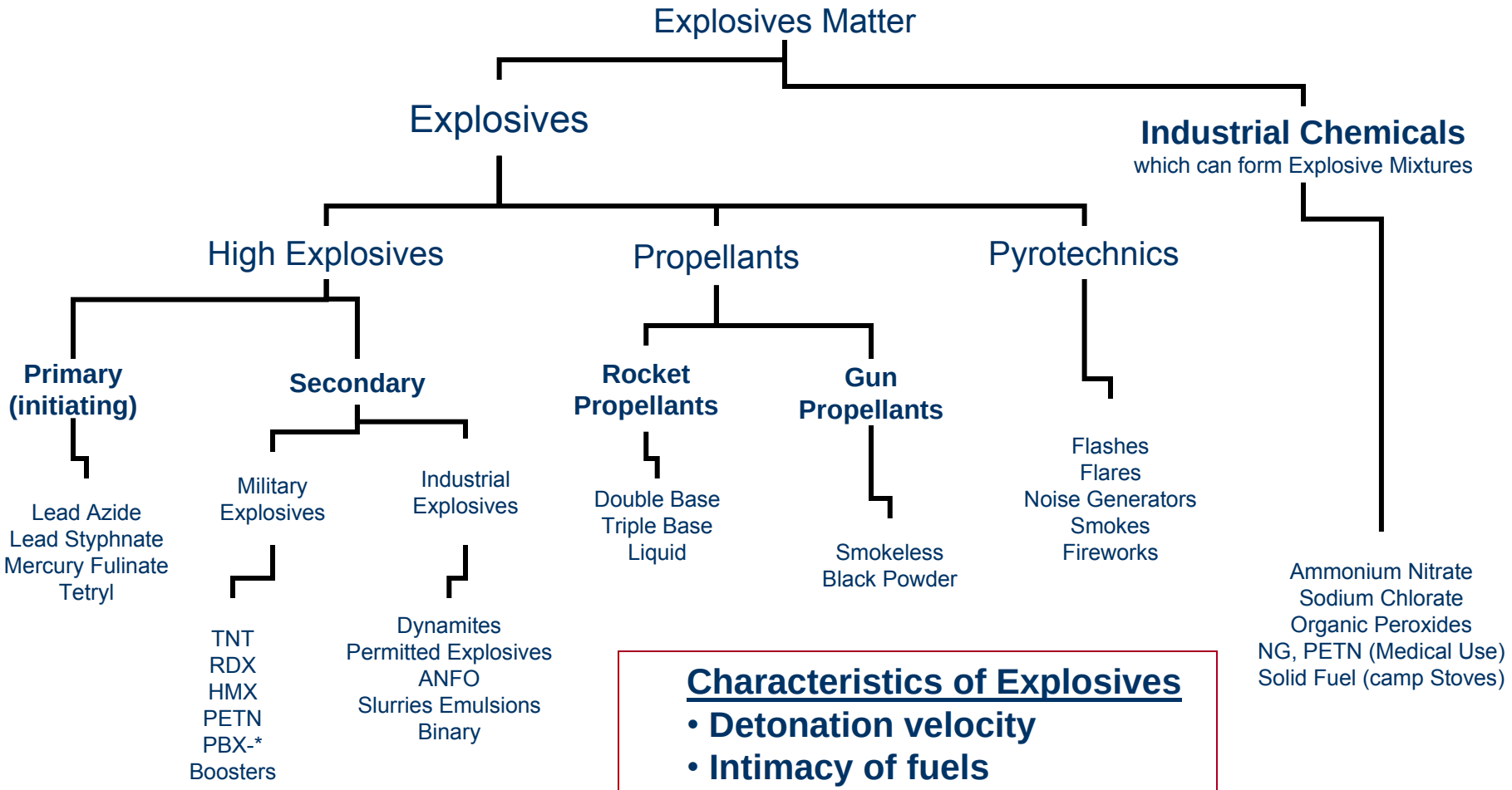
# Explosives Detection Overview
## Classification of Explosives




**Characteristics of Explosives**

- **Detonation velocity**
- **Intimacy of fuels**
- **Sensitivity to external stimuli**

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# Explosives

## Standard Explosives

- TNT
- RDX
- PETN
- Nitroglycerin (NG)
- Ethylene Glycol Dinitrate (EGDN)

## Plastic Explosives

- C-4 (RDX)
- Detasheet (PETN)
- Semtex (RDX + PETN)

## Improvised Explosives

- ANFO (Ammonium nitrate + fuel oil)
- Urea nitrate
- Triacetone triperoxide (TATP)

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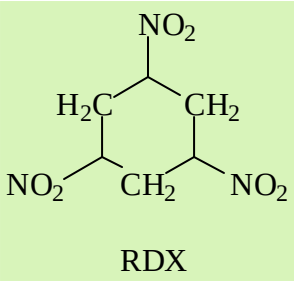
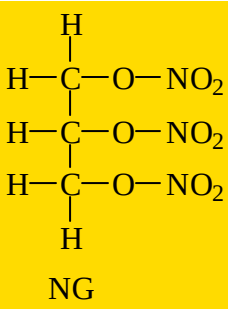
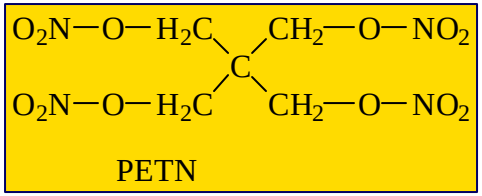
# Explosive Compounds



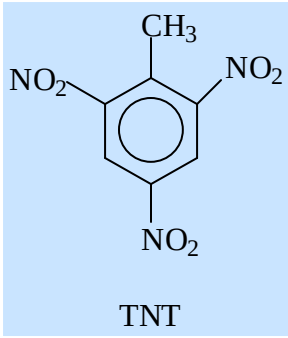
RDX



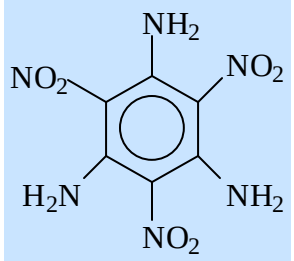
NG



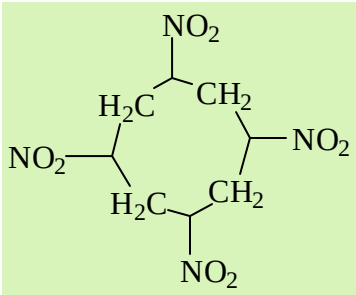
PETN



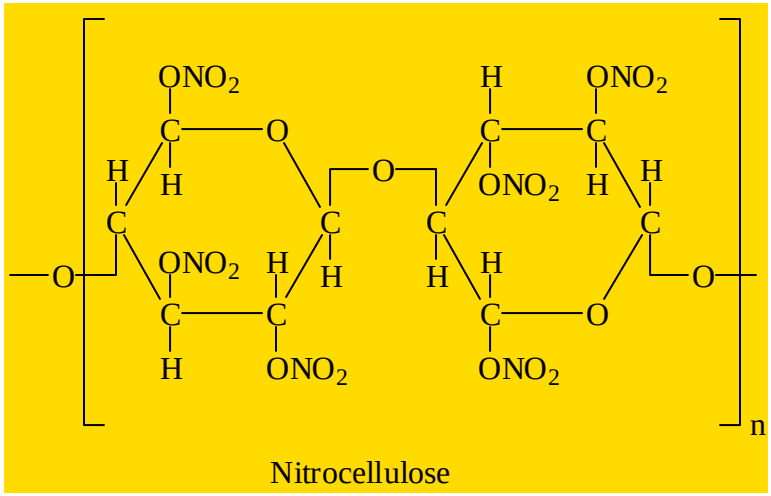
TNT



TATB



HMX



Nitrocellulose

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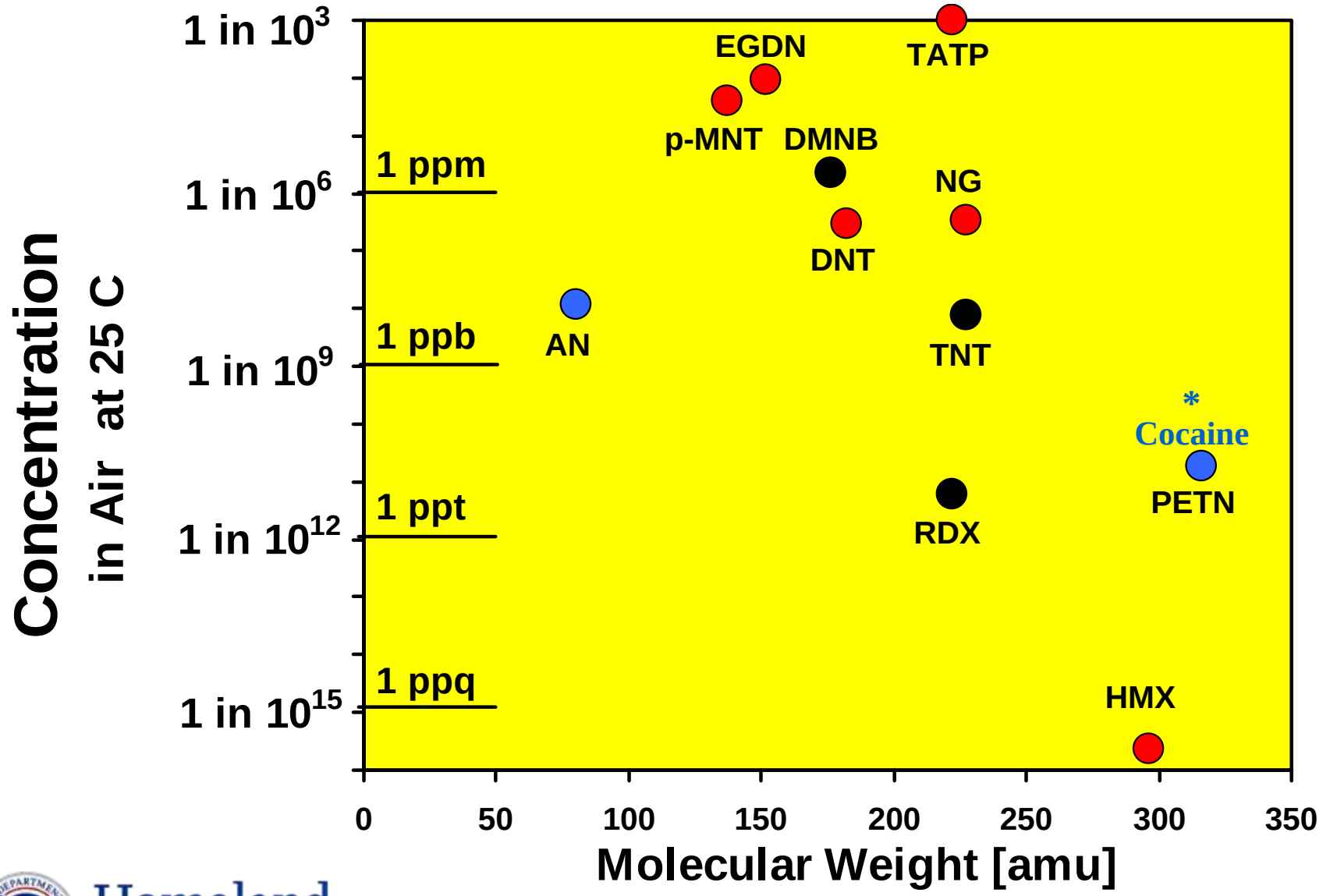
# Vapor Pressure, at Room Temperature . . .

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*Ref: US DOE study . . .*

# Trace Detection: Three processes

- Collect - the sampling process…Front-end collection / preconcentration…
- Separate - provides selectivity of threat…
- Detect - provides sensitivity for the threats of interest…

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# Particle vs. Vapor Sampling

- Most threats only provide spread via particles…
  * exceptions - newer homemade threats…

- Particle - hard, solid surfaces; contact swiping
  - soft surfaces, air jet or vac. sampling

- Vapor - High and low volume air collection.

- Today - need for both, simultaneous…

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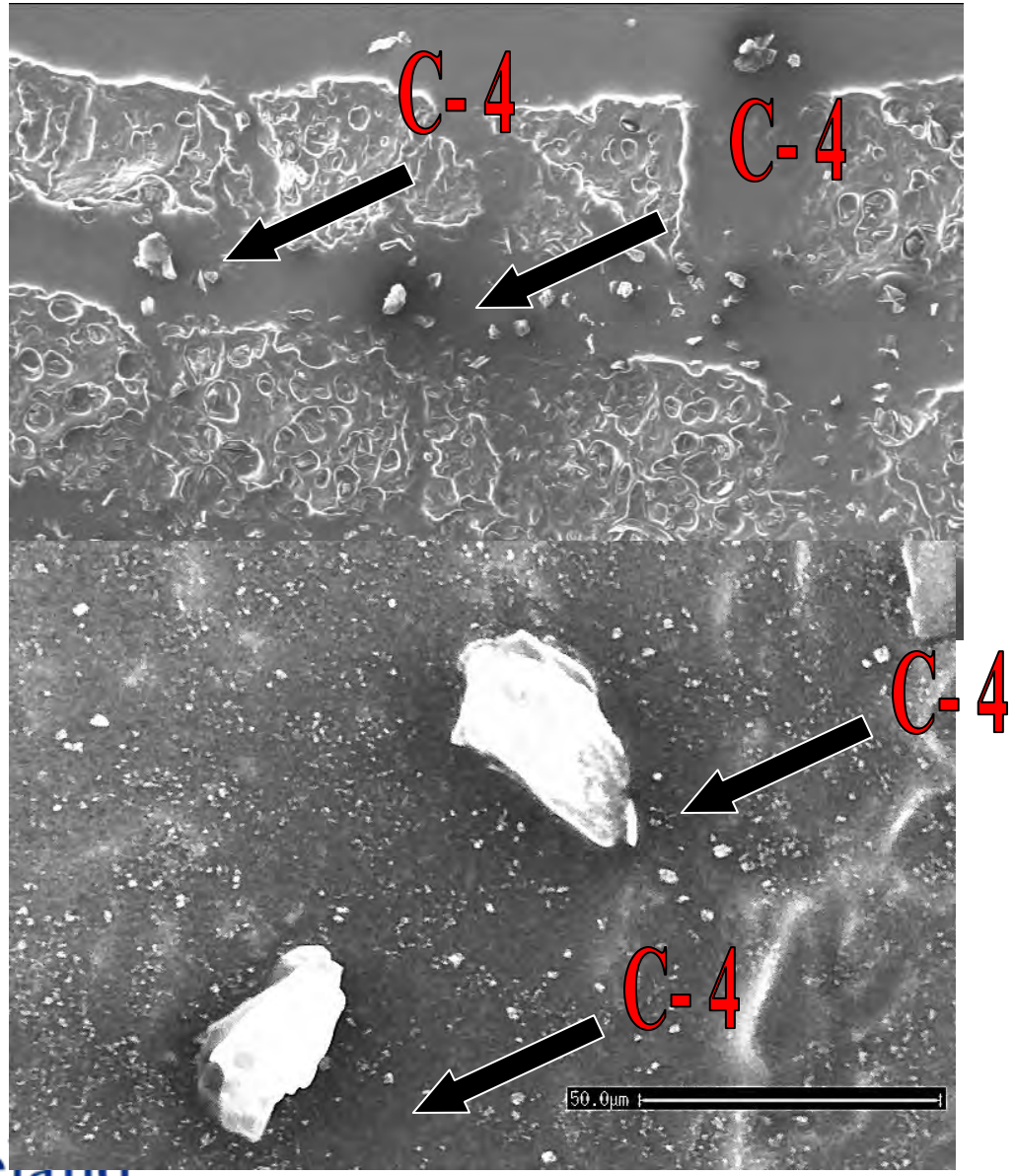
# C-4 Fingerprint

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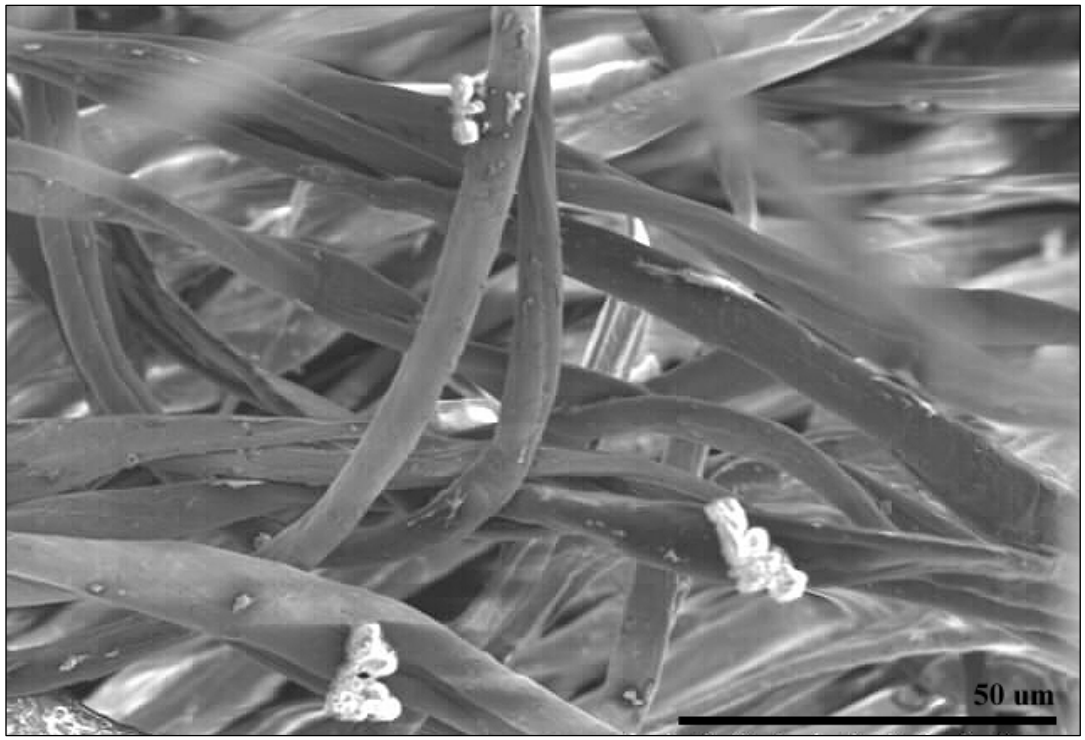
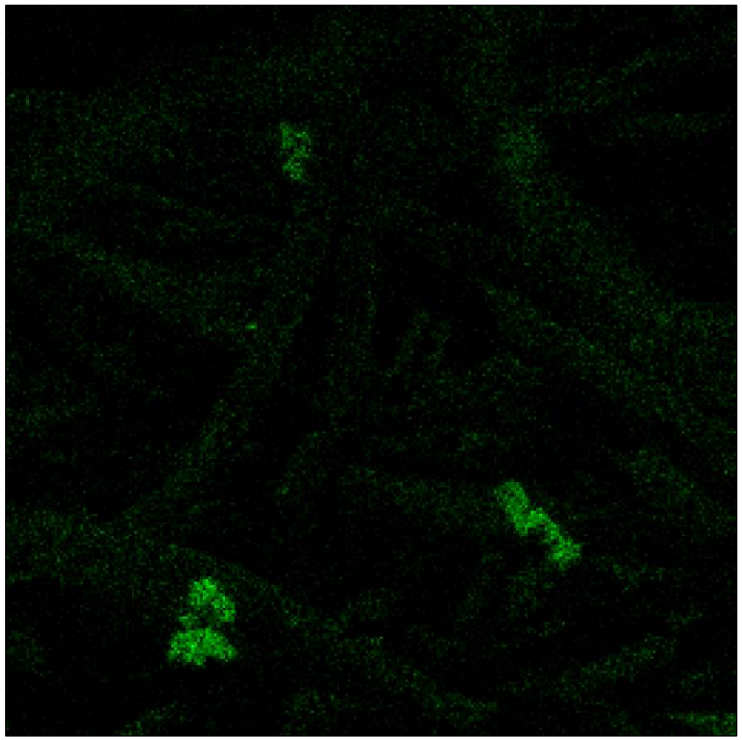
# X-RAY MAPPING OF C-4




SEM of C-4 on Muslin



X-ray Nitrogen Map

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# Particle Sampling

- How to remove from surfaces;

- First, need to know physical and chemical properties of the threat of interest … particle size, stickiness, binding forces, vapor pressure, etc.

- Sample Swiping method - efficiency of collection; careful selection of material, collection via hand wiping or sampling wand, area per collection and pressure to be applied, etc.

.

-Enviromental effects; dry vs. wet surface (vs. type of sample swipe), clean vs. dirty surfaces, etc.

*Reference herein to any specific commercial products, processes, equipment, or services does not constitute or imply its endorsement, recommendation, or favoring by the United States Government or the Department of Homeland Security (DHS), or any of its employees or contractors.*

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# Commercial Trace Sampling Wands

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# Explosives Detection Overview

## ***Trace Detection*** – Deployed Particle Equipment

**Smiths Detection**

**IonScan 400B**

**GE-Ion Track**

**Itemiser$^2$**

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# Vapor Sampling

- How to collect from surfaces;
- First, need to know physical and chemical properties of the threat of interest … vapor pressure, sublimation rate, etc. --------->>>
- Sample method - efficiency of collection; careful selection of collection via low volume or high volume sampling, distance to suspect item critical, etc.
-Enviromental effects; temperature (range of temp), clean vs dirty surfaces (amount of other non-threat vapor), etc.

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# Sampling for Explosive Vapors

**Reynolds Averaged Navier-Stokes**

$$\frac{\partial U_i}{\partial x_i} = 0 \qquad \frac{\partial U_i}{\partial t} + U_j \frac{\partial U_i}{\partial x_j} = -\frac{\partial \hat{p}}{\partial x_i} + \frac{1}{Re}\frac{\partial^2 U_i}{\partial x_j \partial x_j} - \frac{\partial}{\partial x_j}\overline{u_i u_j} + \delta_{i3}\frac{Gr}{\mathrm{Re}^2}\Theta$$

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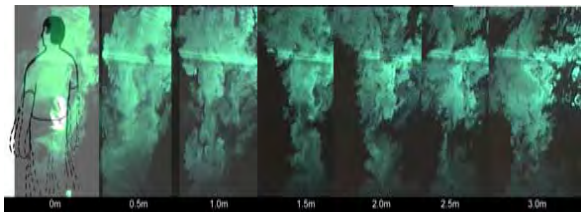

# Explosives Detection Overview
## ***Trace Detection*** – Vapor Detection Equipment

**GE – IonTrack**

**VaporTracer2**

**Smiths Detection**

**Sabre 4000**

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# Explosives Detection Overview
## ***Trace Detection*** – Whole Body Screening

**GE – IonTrack**

**EntryScan$^3$**

**Syagen**

**Guardian**

**Smiths Detection**

**Sentinel**

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# Explosives Detection Overview

## ***Trace Detection*** – Canines

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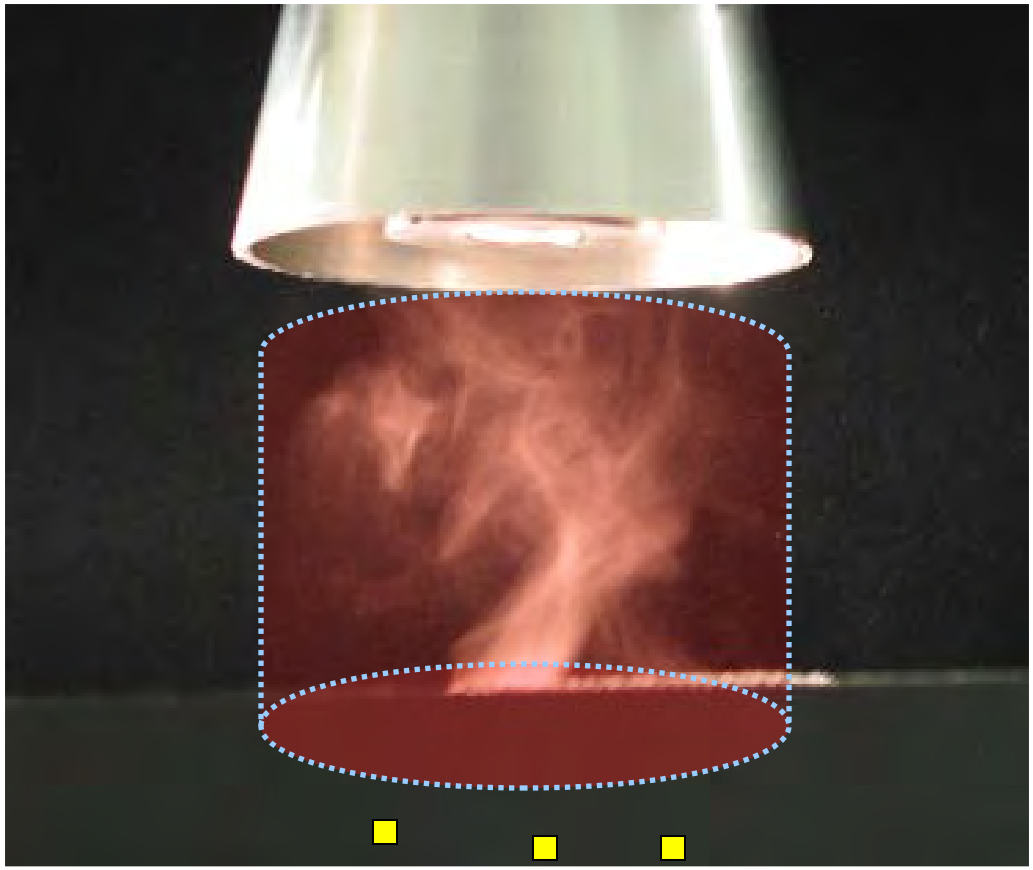
# Vortex Sampling System



**Axial cyclone with return flow designed to generate an artificial tornado and pick up vapors of explosive materials without physical contact with a surface.**

**Sampling distance is ½"-13½".**

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IMPLANT SCIENCES CORPORATION

# Trace Explosive Detection Technologies

- Electronic/Chemical: Picogram sensitivity
  - Ion Mobility Spectrometry : Widespread use:  Separates and Analyzes in seconds
  - Chemiluminescence: Extremely sensitive, need to separate explosives from other compounds
  - Electron Capture Detection:  Sensitive, but needs separation step
  - Surface Acoustic Wave: Trade off between specificity and sensitivity
  - Thermo-Redox: Sensitive, needs separation step
  - Mass Spectrometry: Requires high vacuum, is fragile but very sensitive
- Colorimetric (Chemical):  Sensitive only to micrograms to nanograms
- Biosensor
  - K-9s: Sensitive, versatile, must train to application
  - Antigen Antibody:  Very sensitive, but very specific

# Technology Requirements

- Meet Detection Specification for Sensitivity and Selectivity for Specified Threats.
- Very Low False Alarm Rate
- Very High Probability of Detection
- Minimal Decision Making by Human
- Automated
- Robust
- Can Be Operated by Screeners (Not the Ones That Have a Masters Degree in Physics)
- Not Too Expensive (ETD, consumables, etc.)
- Privacy Concerns Addressed

# Deployed Trace Detectors

- BARRINGER
  - Technology - Ion Mobility Spectrometry
  - Approved models - IonScan Models 400 and 400B
- IONTRACK
  - Technology - Ion Mobility Spectrometry
  - Approved models - Itemizer-DOS &  Itemizer-W
- THERMODETECTION
  - Technology - GC/Chemiluminescense
  - Approved models - EGIS Models 3000 & II

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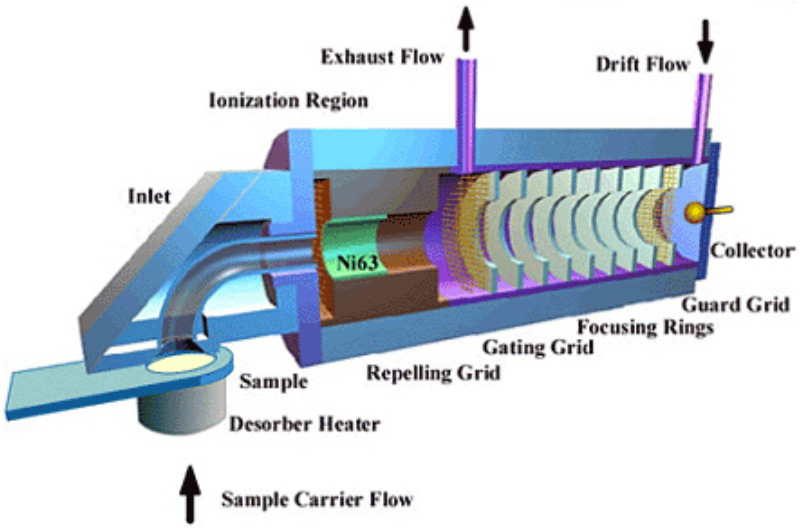
# ION MOBILITY SPECTROSCOPY (IMS)




- Substrate heated to vaporize particles
- Molecules are ionized by a weak radioactive source and drift through a weak electric field
- Particle time of flight is a distinct fingerprint, enabling detection

## Applications:

- Explosives detection on both luggage and people
- Detection of narcotics

## Technical Barriers:

- Dependent on screener sampling
- Susceptible to atmospheric changes
- Calibration requirements
- Saturation possible

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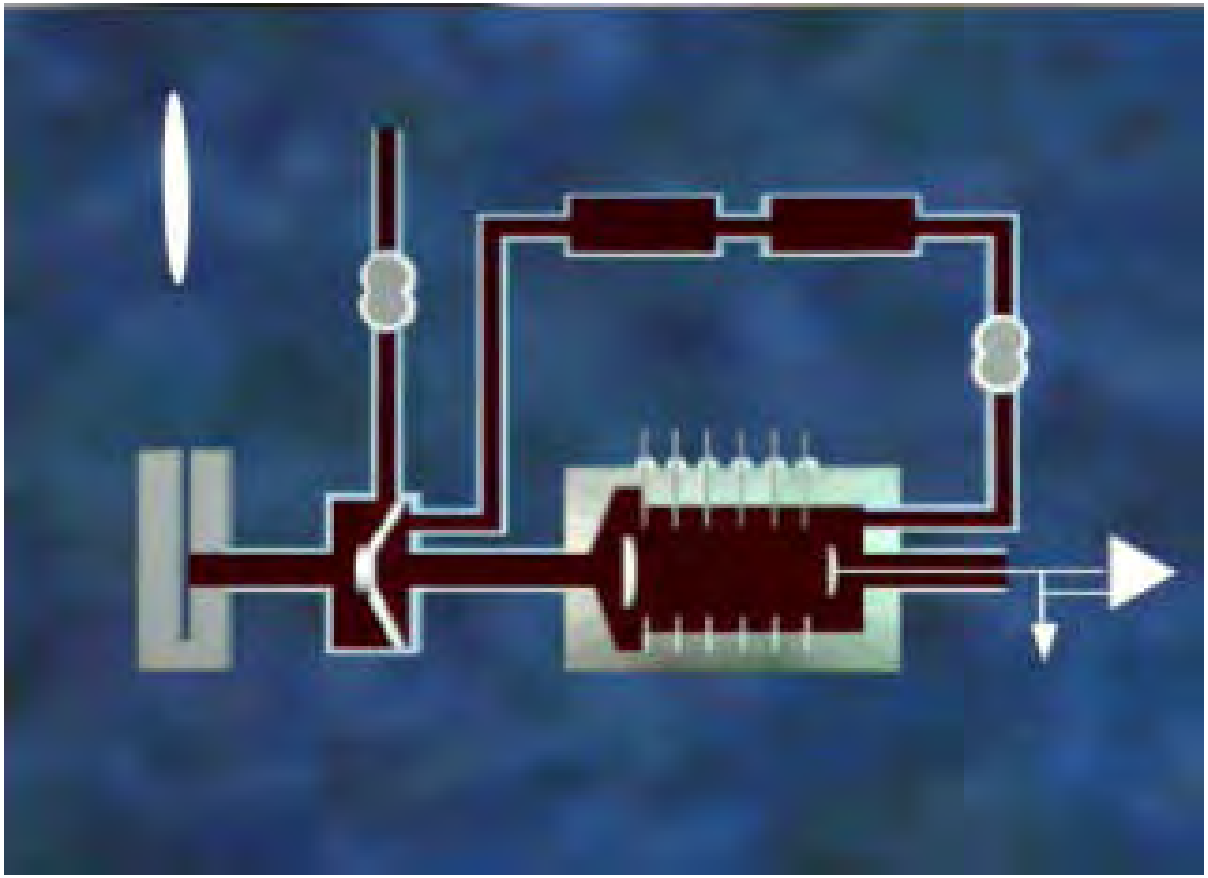
# ITMS Detector
# How It Works



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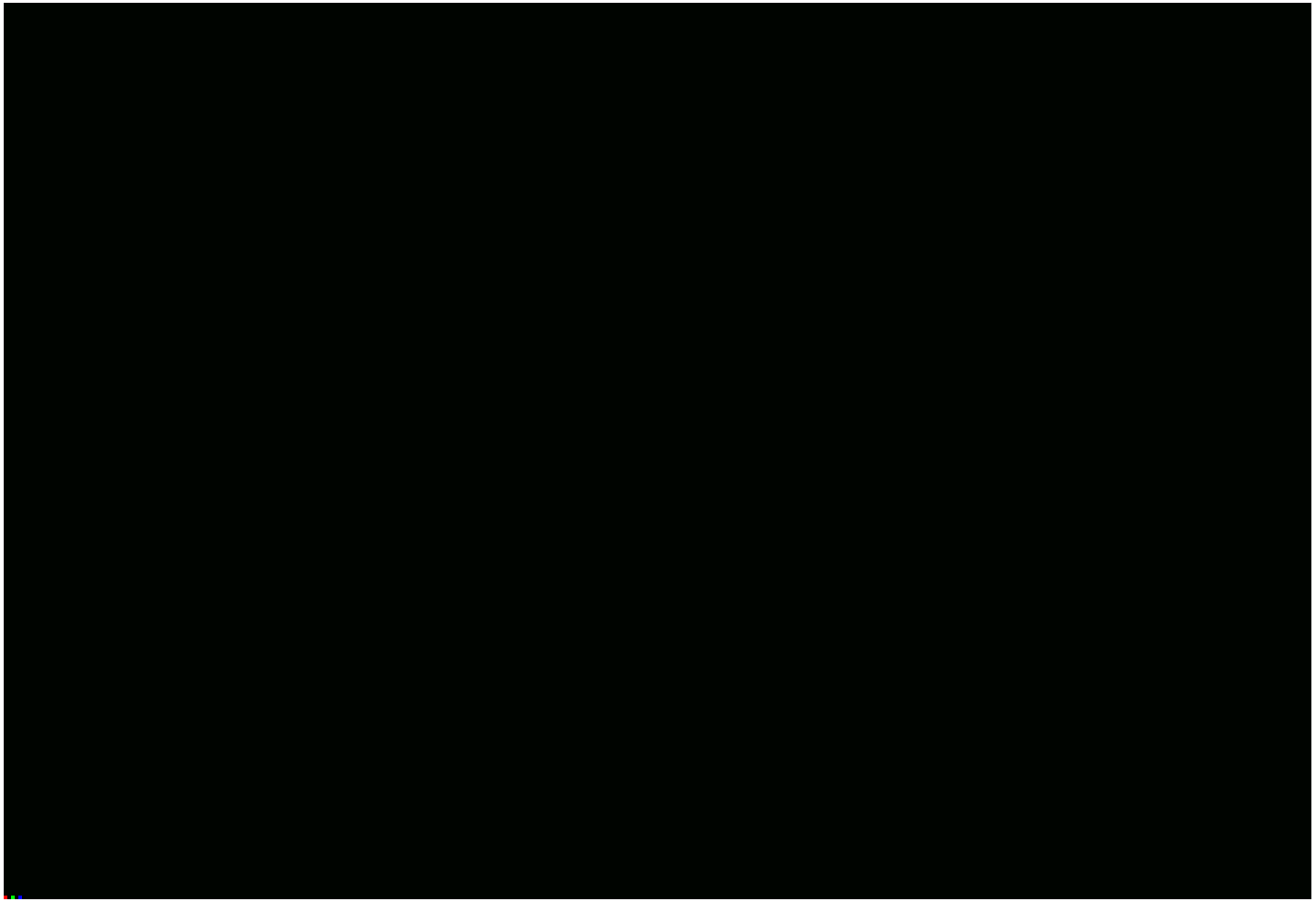
# Simultaneous, Dual-Mode Detector



# Challenges to Trace Detection

## Interferential Only

An alarm does not necessarily mean a bomb if sampling for particles but you need a good reason to be contaminated! **If you see vapor, YOU HAVE A BOMB!**

## Sampling

True vapor and particle sampler does not exist

Its about getting the sample!!

Currently highly dependent on skilled operator

## Selectivity/Sensitivity

- A wider range of threats (cross-applications) needs to be addressed and developed for Trace Detection, eg. Chemical agents, transparent Extremely sensitive explosive detectors exist, but ability to detect more compounds, lower false alarm rate needed.

- Operational alarm rates are “reasonable” for many of the current applications; but are prohibitively high in others.

# Explosive Trace Detectors
# The Future …

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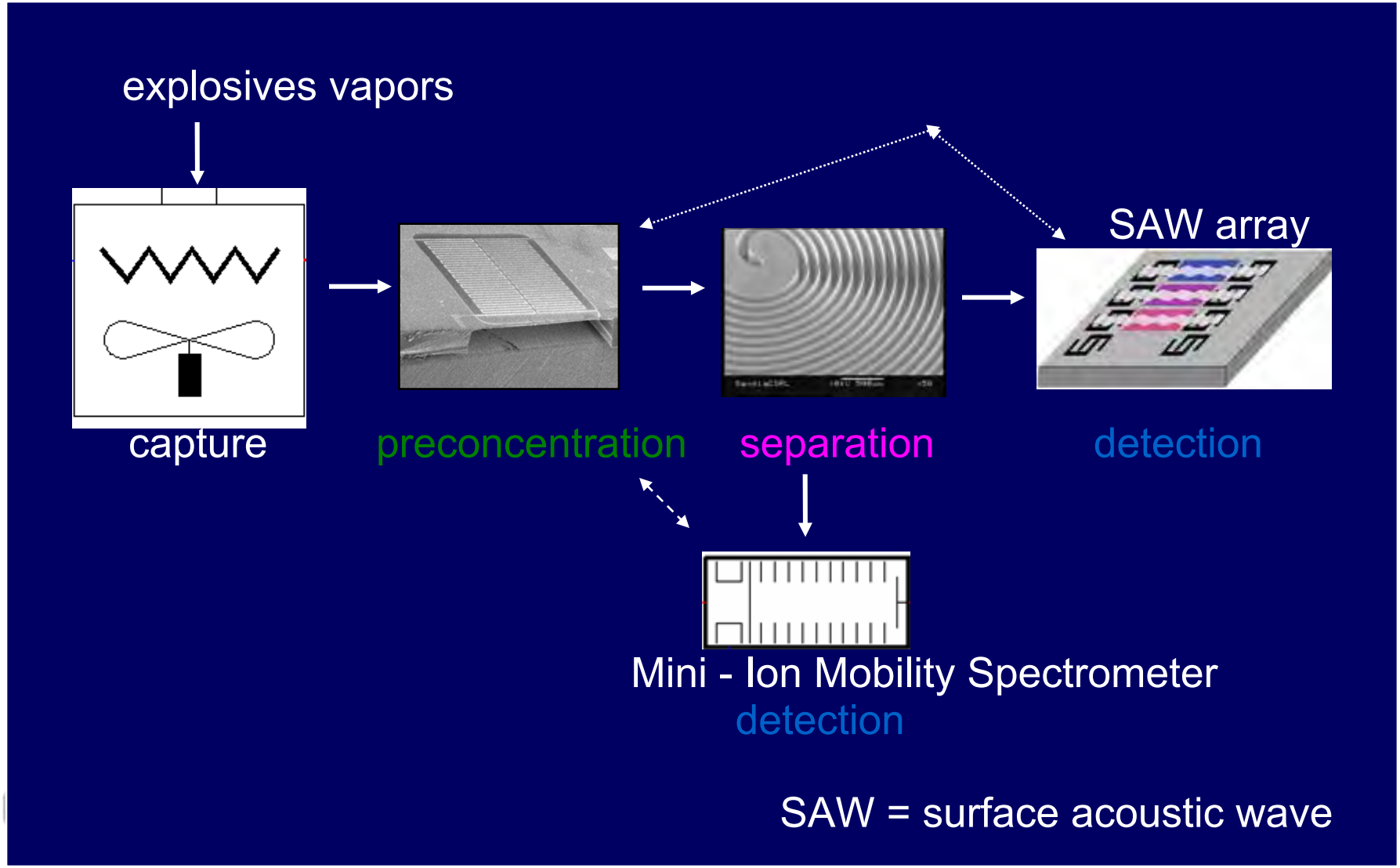
# Near – term ETD's . . .
# and improvements to sample collection . . .

# MicroHound III

# MicroHound™ Concept



# Microsensors

## Requirements for Detection of Explosives for First Responders

- Small and portable
- Specific to one or more explosives
- Array of Sensors – provides full threat coverage, and Improved alarm statistics.
- Sensitive (and Selective).
- Low cost

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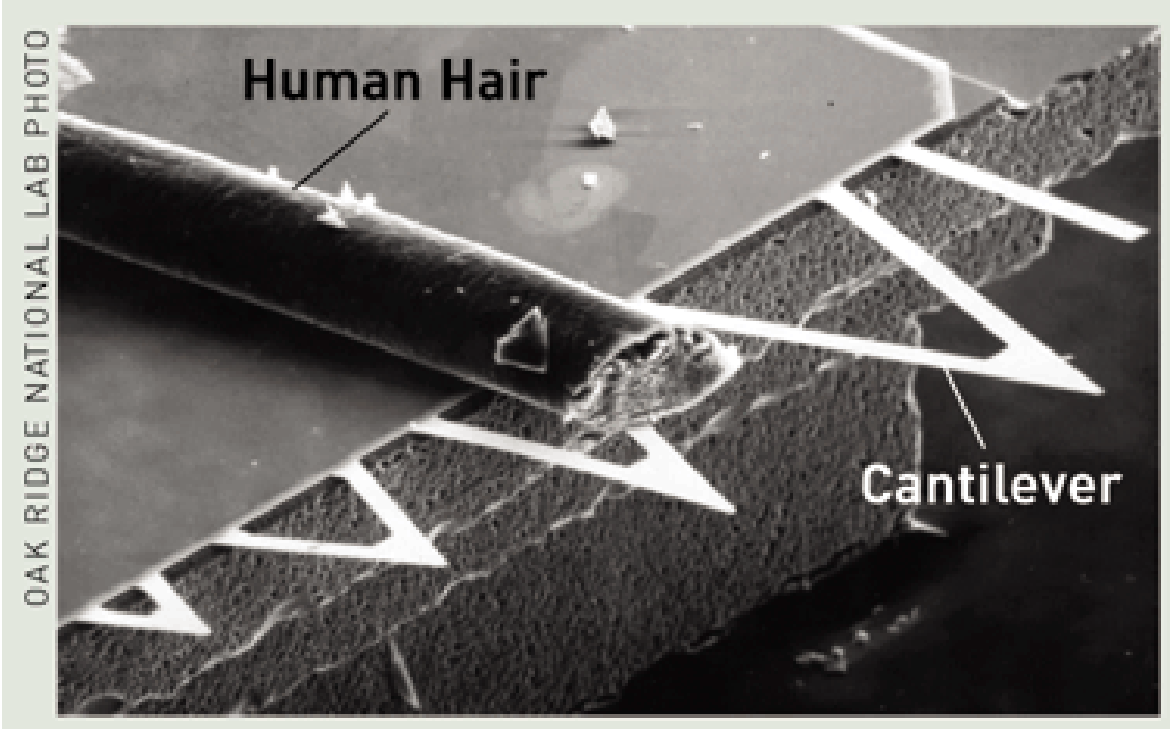
# Micro-electromechanical System (MEMS) Cantilever




*Ref: T. Thundat et al, ORNL*

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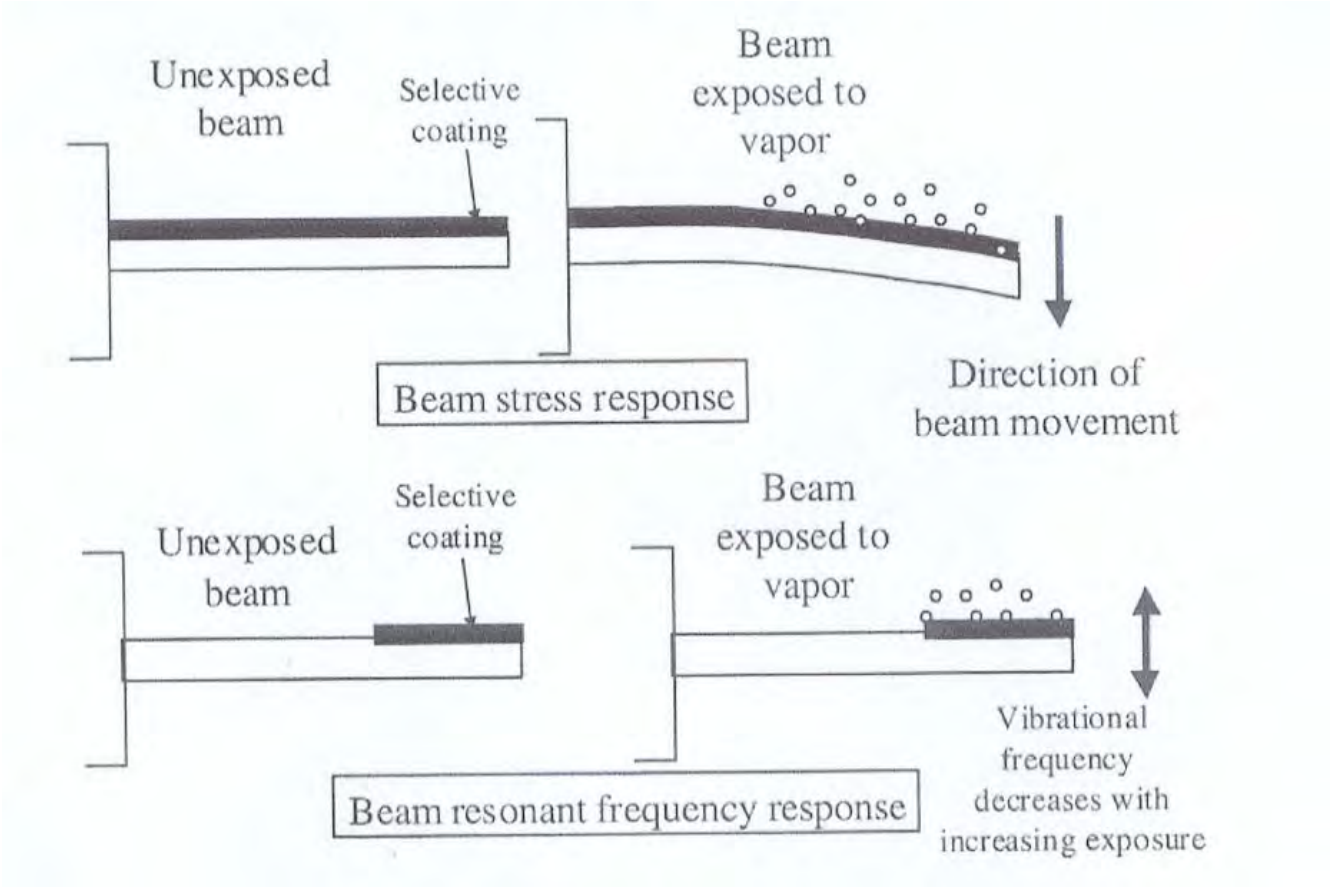
# Micro-electromechanical System (MEMS) Cantilever




*Ref: Coatings NRL & ORNL*

ATF /TSA uCantil. Progm.

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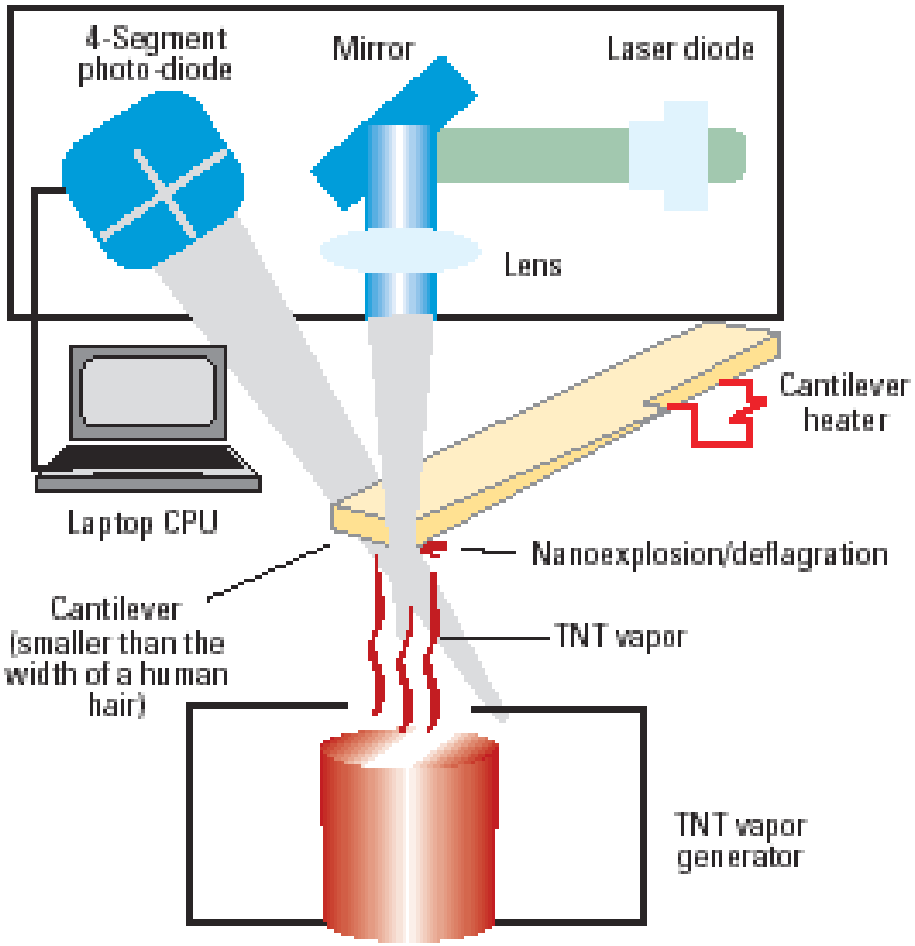
# Micro-electromechanical System (MEMS)

Is based on miniature micro-machined silicon cantilevers (a few hundred μm long and 1 μm thick) that can detect tiny forces caused by heat-induced nano-explosions. The silicon material absorbs the explosive vapor, which is heated and undergoes tiny explosions that are detected by an optical beam. Scanning the temperature of the cantilever allows detection of various explosives, according to their temperature of deflagration.

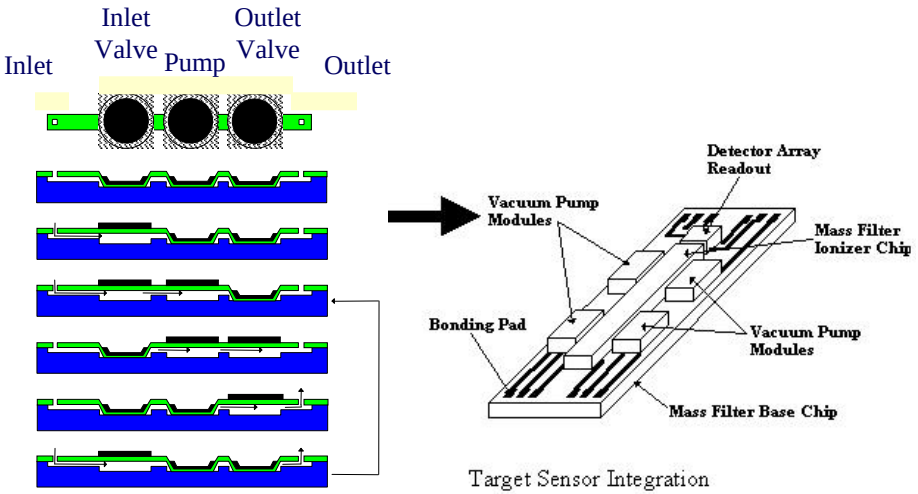
Sensitivity: 10-30 ppt of RDX and PETN (femtogram range)

## Cantilever detection system




T. Thundat et al., Ultramicroscopy, 97, 433, 2003

# Mass Spec on a Chip/MEMS



Target Sensor Integration

- R&D of a front end Chemical sensor for the MEMS based MS on a Chip (and support of MS development project).

MS on a Chip
- Partnership with NG/ARL/DARPA

- Report with evaluation of one type of front end chemical sensor (gas centrifuge separator).

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# What analyte is a detection dog signaling on?

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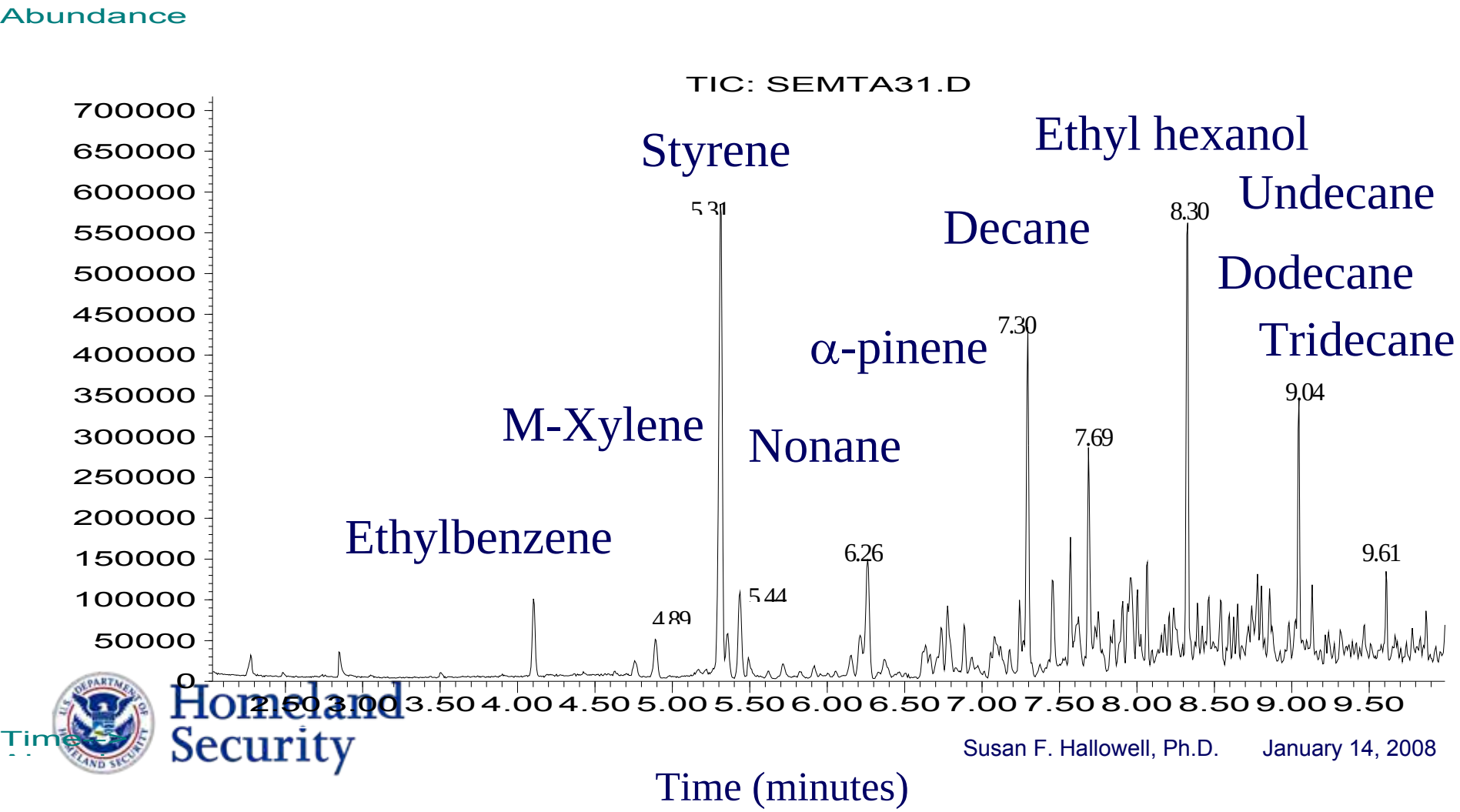
# Semtex H Headspace Analysis

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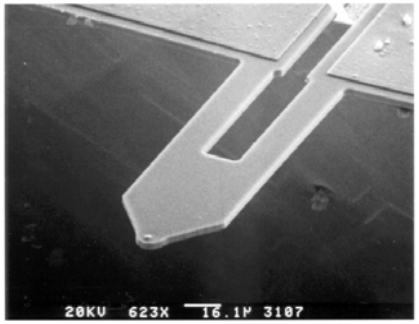
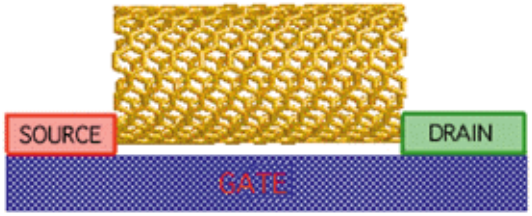
# The Future of Trace?

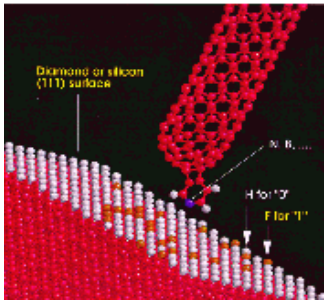
- **Automated Samplers:  The key is the front end!**
- **Trace Explosives and CW/BW Sensor Development, Metal Detection, etc.**
- **Embedded Detectors in containers/walls**
- **Nanotechnology:  sources and detectors**




**Nano detection on micro systems**




**CNT – nano explosives Det.**



**CNT – nano wire sensor**

***Effort with NASA Ames Research Cntr.***

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# Future Prospects

- **Novel Collection/Sampling Systems, New ETD's – including other technologies like MS, Spectroscopy (THz, CRDS, ...), etc.**
- **Microsensors/electronic noses – as Array Detectors.**
- **Nanotechnology will become the major driver for microsensors, and certainly a long-term future development.**

# Conclusions…

- **Today/Future - need to efficiently sample both vapor and particle at same time…**

  - **Automated - to eliminate or reduce human training and human ability to sample.**

  - **Non-contact (if possible) - to reduce interaction with surfaces and eliminate wiping of surfaces (manual sampling issues, cost of consumables, etc.).**

- **Ability to detect threats with Trace Explosive Detection is a combination of Sampling and Detection…both critical processes.**

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# Questions?

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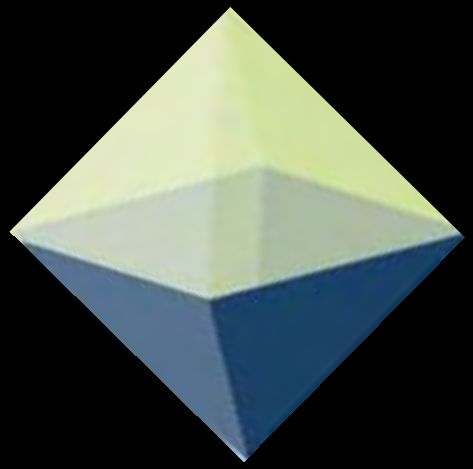
Homeland
Security



# Universal Detection Technology

## TRAINING

To use this training presentation, simply click your space bar to move to the next frame.

Universal Detection Technology

# Using the TS-10-5 Biothreat Detection Kit

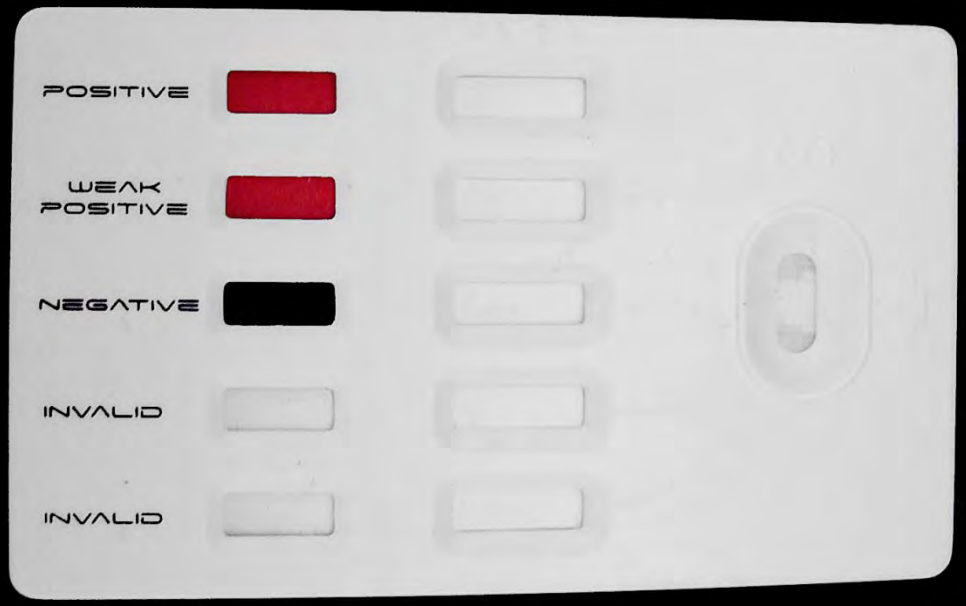
# Universal Detection Technology

UDT developed the TS-10-5 product line to be extremely easy to use, while providing you with sensitivity and specificity unmatched by any other rapid test available today - PERIOD!

- Easy to use - results in as little as 3 minutes.
- Extremely accurate with excellent detection capabilities.
- Excellent sensitivity and specificity.
- No expensive equipment or electronic readers required.
- Preservation of sample - Requires only one small sample.
- No cross-reactivity to dozens of near-neighbor strains or common powders - including corn starch, yeast, flour and aspirin.
- Successfully evaluated by the DOD, Ministry of Defense (UK) and the EPA.

# Universal Detection Technology

For the purpose of this training exercise, we will be using the TS-10-5 simulation/trainer device. The simulation/trainer is designed to function just like the actual TS-10-5 test.
Run correctly, it will provide you with 5 unique examples of the results that may be seen when performing an actual test in the Hot Zone or in the lab.



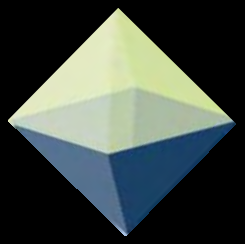
# Getting Started

1. Remove the contents from the foil pouch and place them in front of you.
2. Unfold the instruction sheet and place it where you can easily read the information.
3. Tear open the white foil pouch and remove the test.

# Getting Started

Everything you need to perform our tests are included in each kit.
No additional collection kits or electronic readers required.

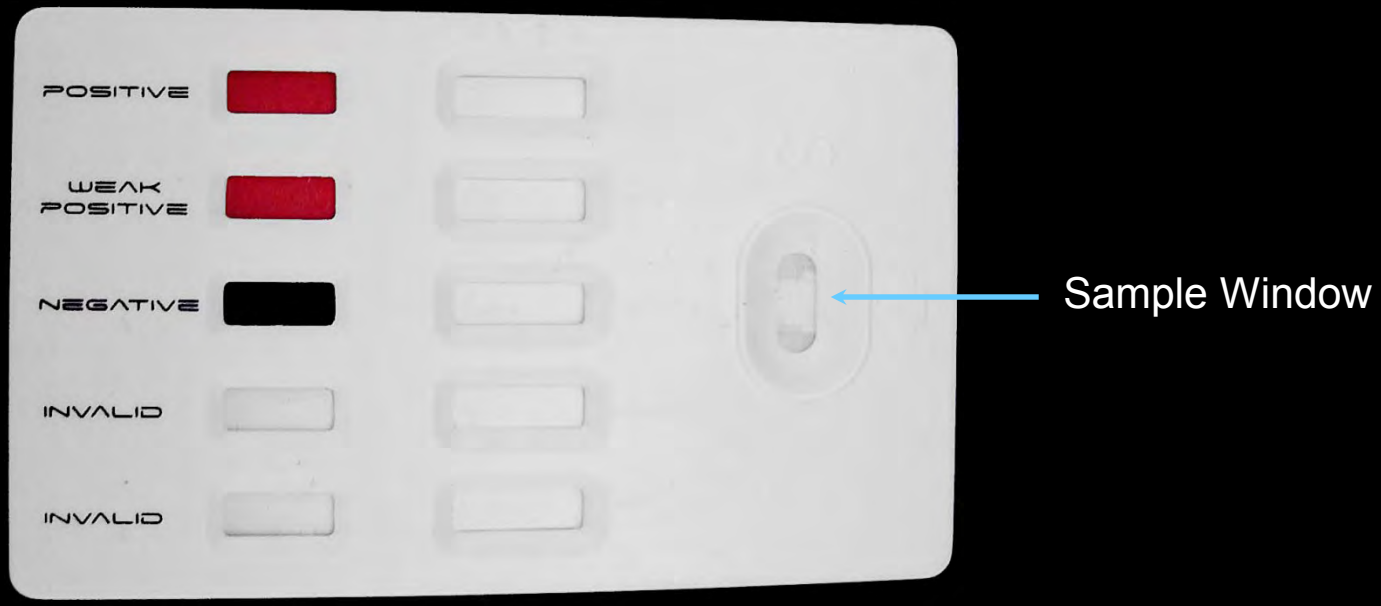
- Each Simulation test kit will include the following:
- 1- Large foil pouch which can serve as a biohazard bag.
- 1- 3x5 white foil pouch which includes the actual test and moisture bag.
- 1- Simulation Card.
- 1- Instruction sheet.
- 1- dropper/swab/pipette micro-tube with liquid buffer.



Universal Detection Technology

# Performing the Test

- Place the test in front of you with the text upright and the oval sample window to your right.



# Performing the Test

- Next - Unscrew the cap from the diluent tube and begin removing the swab.
- Before completely removing the swab, rub the foam tip around the inside of the tube to remove excess liquid.

# Performing the Test

- With the simulation card placed in front of you, rub the tip of the pre-moistened swab over the logo for approximately 5 seconds, rolling the cap between your fingers as you go - this will help extract more of the simulation material.

(The ball has a simple food protein imbedded on its surface which represents a suspicious substance)

# Performing the Test

- Return the swab back to the diluent tube and firmly tighten the cap.

# Performing the Test

- Shake the tube up and down for approximately 5 seconds

# Performing the Test

- Remove the clear protective cap and place it to the side.
- Using your thumb or index finger, snap the tip off the top of the tube.

# Performing the Test

- **SLOWLY** add 8-10 drops of sample into the sample window.
- Replace the clear protective cap back onto the diluent tube and set the tube aside.

Universal Detection Technology

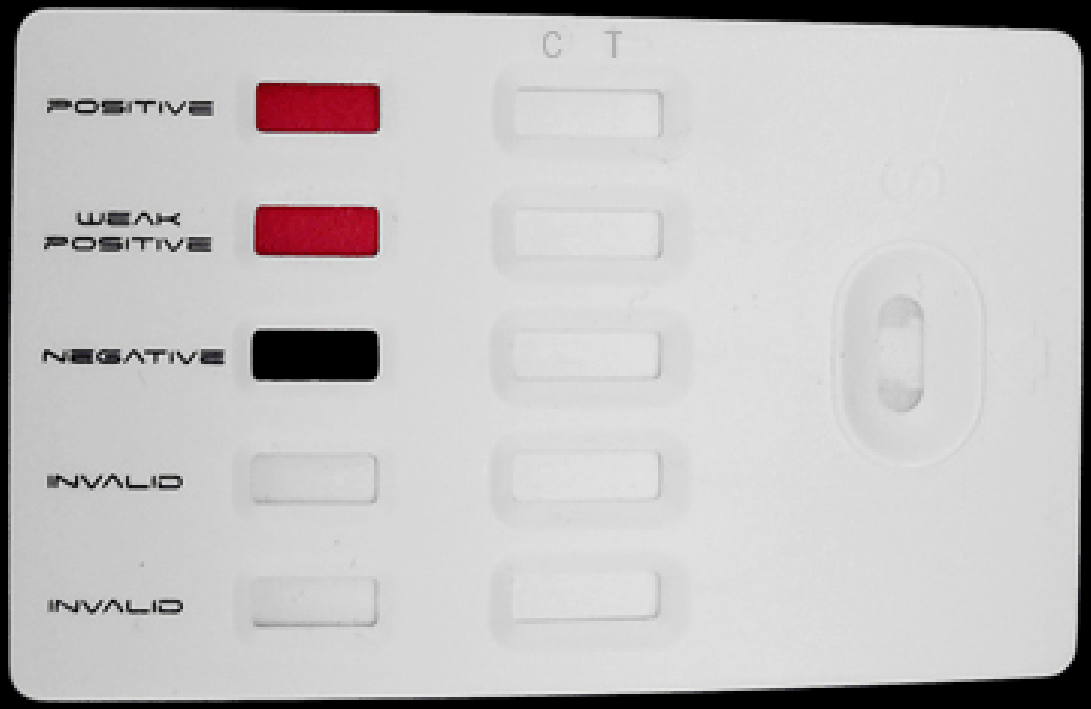
# Performing The Test

- As the test starts to work - you will begin to see a faint reddish color begin to migrate across the test windows.
- Colloidal gold, coupled with antibodies create this color.

# Performing The Test

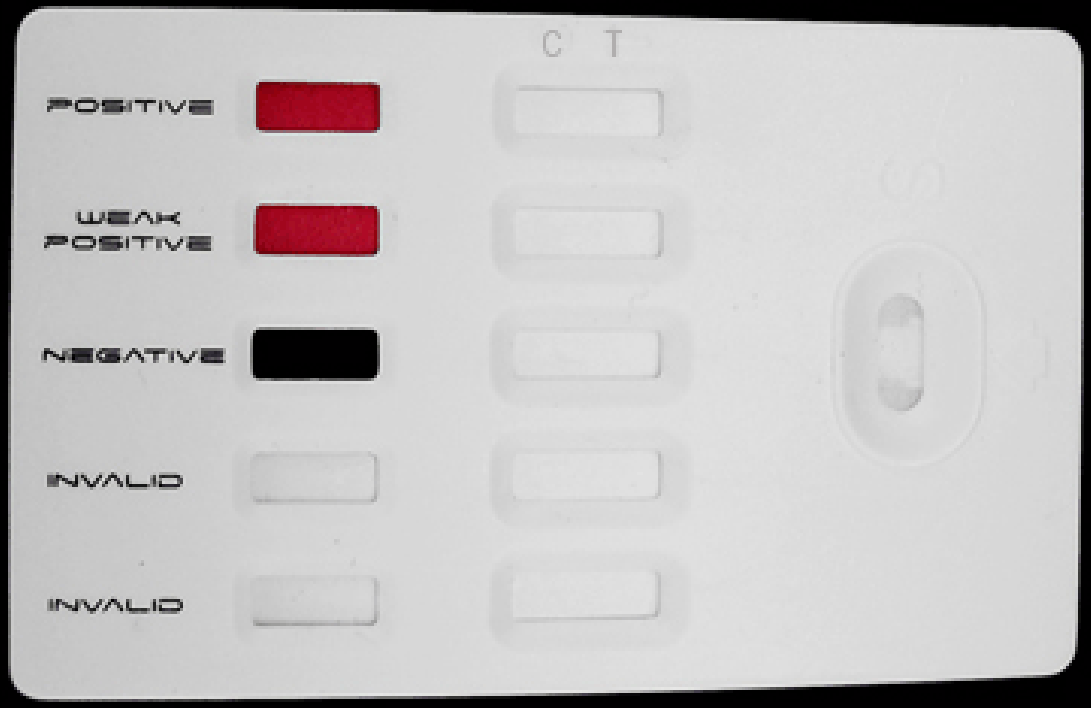
- As this color continues to migrate across the test window - faint lines will begin to appear under the control line (C) and/or the test line (T)
- (No lines will appear in the last invalid window)

- Click your SPACE BAR to see the test work - (example run time, 20 seconds)



# Performing The Test

- As the reddish material continues to migrate, the test windows will begin to clear and your result lines (C) & (T) will become more distinct.
- Within 5-10 minutes your test window will become white again - leaving only the test result lines.
- Once again - you can click your SPACE BAR to see the test work- or triple click to move to the next frame.
- The next frame will provide you with an understanding of the results.



# Understanding The Results

**Positive:** When two lines appear in any single window, the test is positive for that particular analyte or substance.

**Weak Positive:** When two lines form but the line under the (T) is faint or barely visible. Regardless of its intensity, the test should be considered a positive result.

**Negative:** A single line under the (C) with no visible line under the (T) means the test is working correctly and that the test is negative. You should always see a line under the (C)

**Invalid:** When a single line forms under the (T) but fails to form under the (C) means the test is invalid and a second test should be run. (An invalid result is very rare)

**Invalid:** When no lines appear in any single window. The test is invalid and a second test should be run.
(An invalid result is very rare)

Your Simulation/Trainer should look like the example above when complete. If you do not have these results please inform your instructor and revisit the instruction sheet.

# Understanding The Results

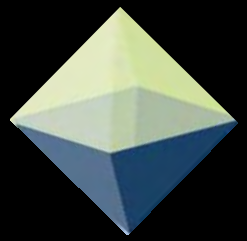
•The test below is an actual TS-10-5 device indicating a positive result for Bacillus Anthracis (Anthrax).

•As you can see, Ricin, Botulinum, Y. pestis and SEB  are indicating negative results.

# Universal Detection Technology

Information

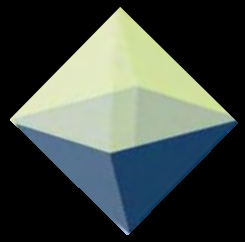
An extensive amount of Research and Development has gone into the TS-10-5 product line, providing extraordinary sensitivity and specificity, unmatched by any other Hand-Held Assay available today. The lowest limits of detection, (LOD) along with the precise detection of very specific analytes, provides an exceptional level of confidence when going into a potential credible threat.



# Universal Detection Technology

We hope you found this presentation helpful and informative. Please let us know if you have any suggestions on how we can make this presentation better by contacting us at our web site at www.udetection.com

If you have any further questions or need additional information please visit us at www.udetection.com or call us at 310-248-3655

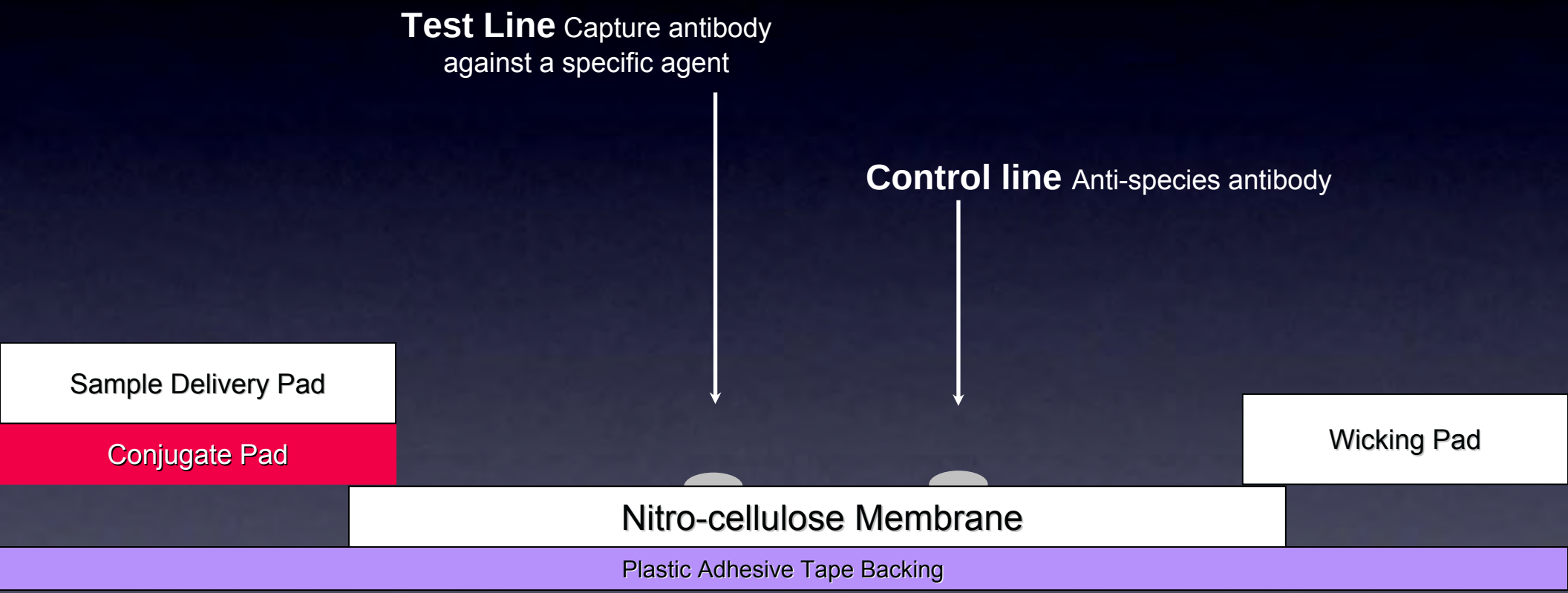


Universal Detection
Technology

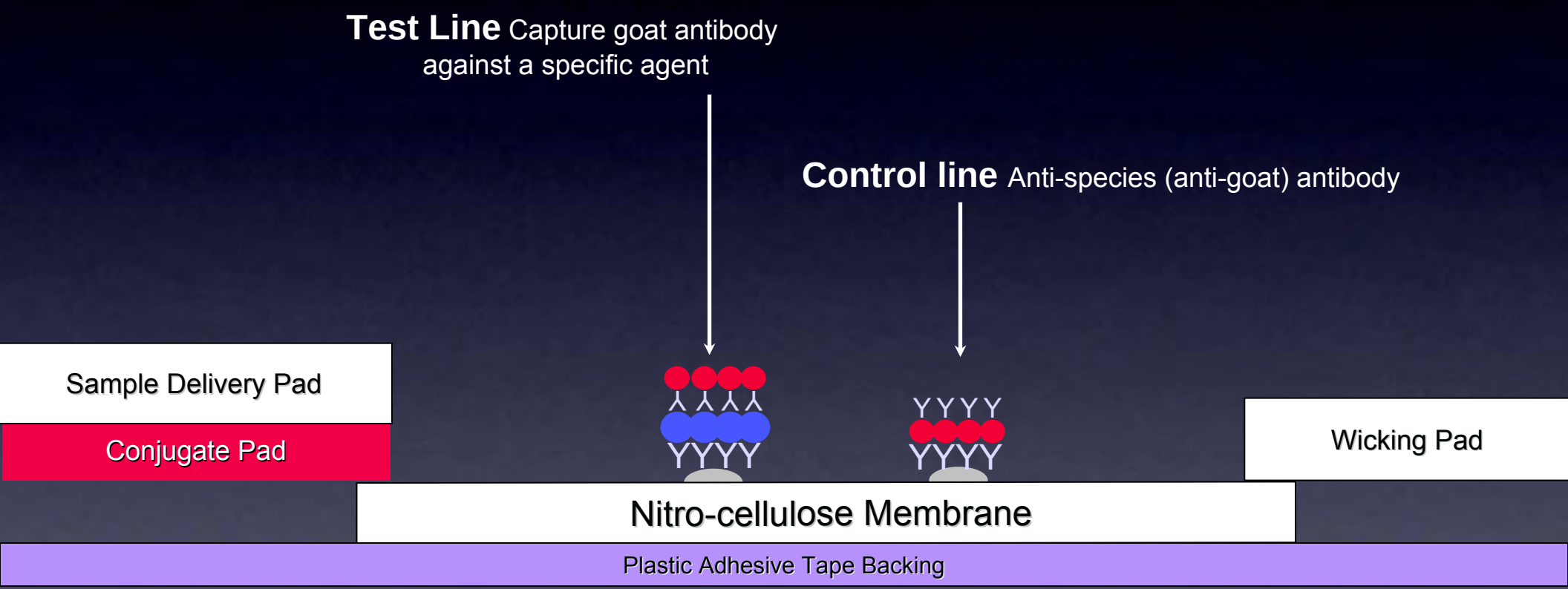
www.udetection.com

310-248-3655

# Components of Lateral Flow

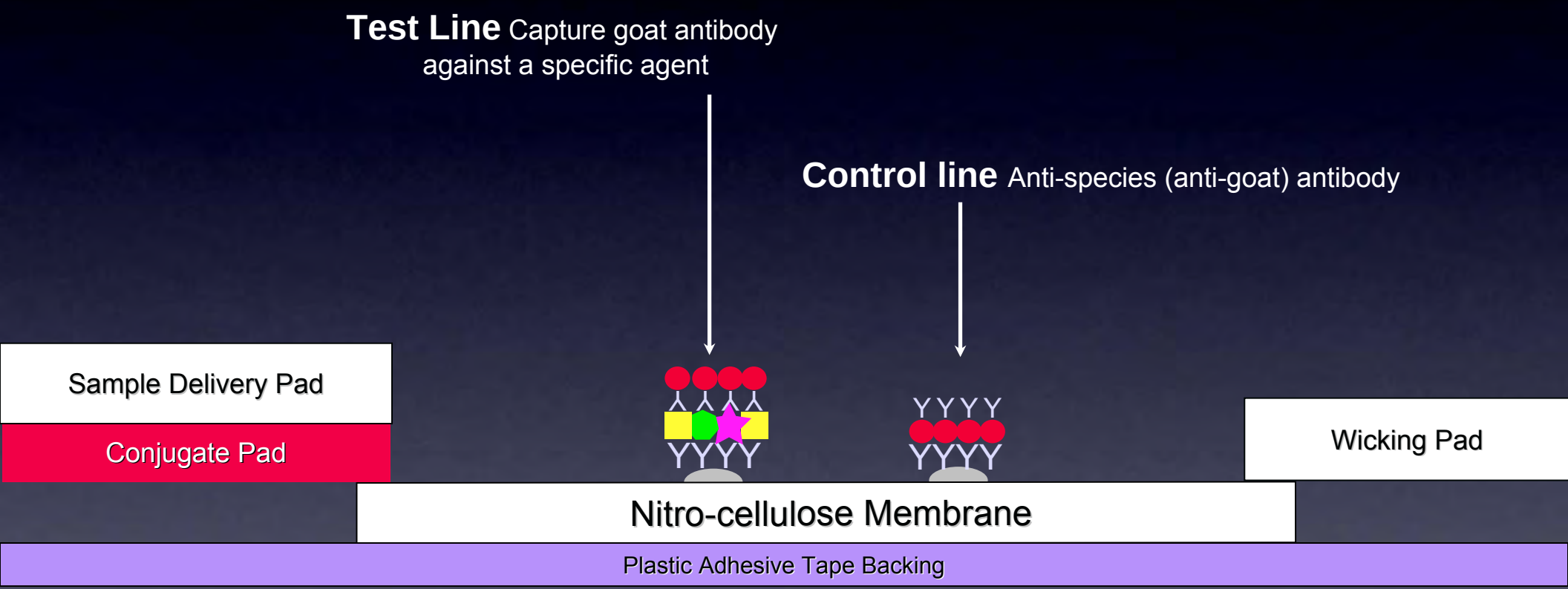


# How Lateral Flow Tests Works



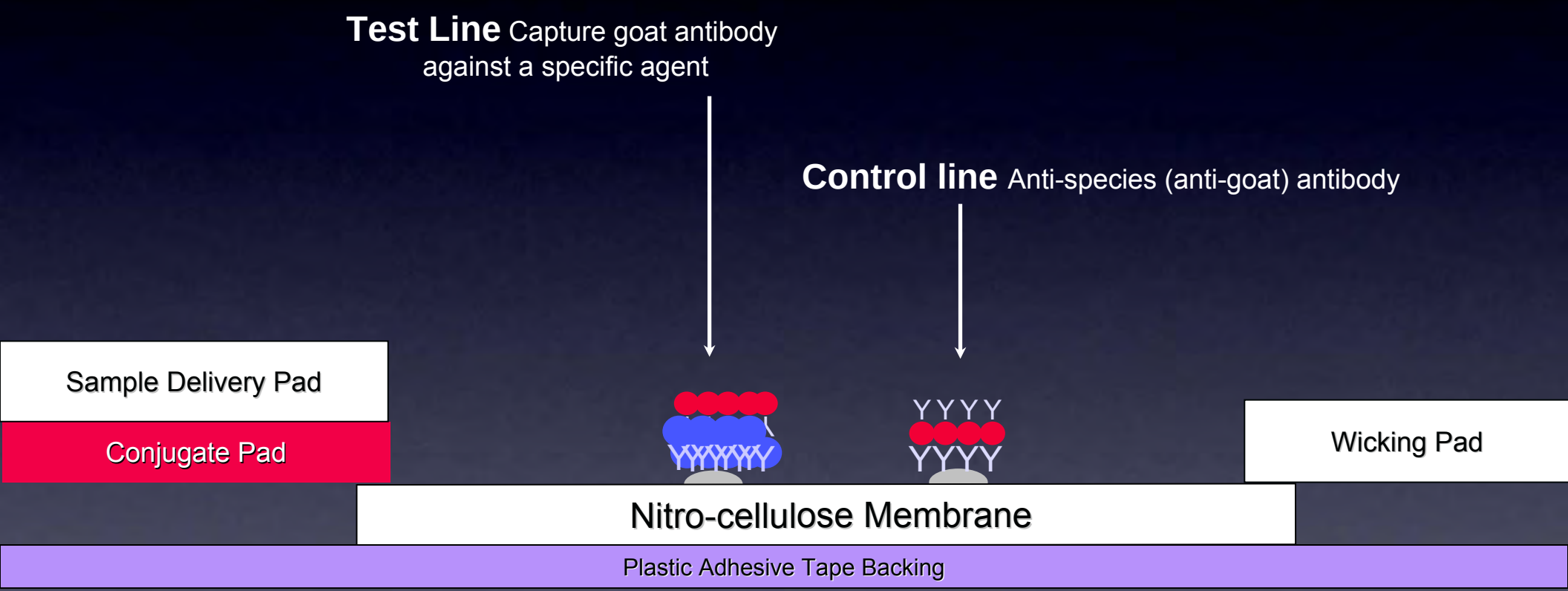

Anthrax Test

# False Positive Results




Anthrax Test

# Hook Effect
# or
# False Negative Results




Anthrax Test

# Understanding the Results

## Positive

Two lines present in the result window regardless of the intensity

## Invalid

One line present at the Test line

## Negative

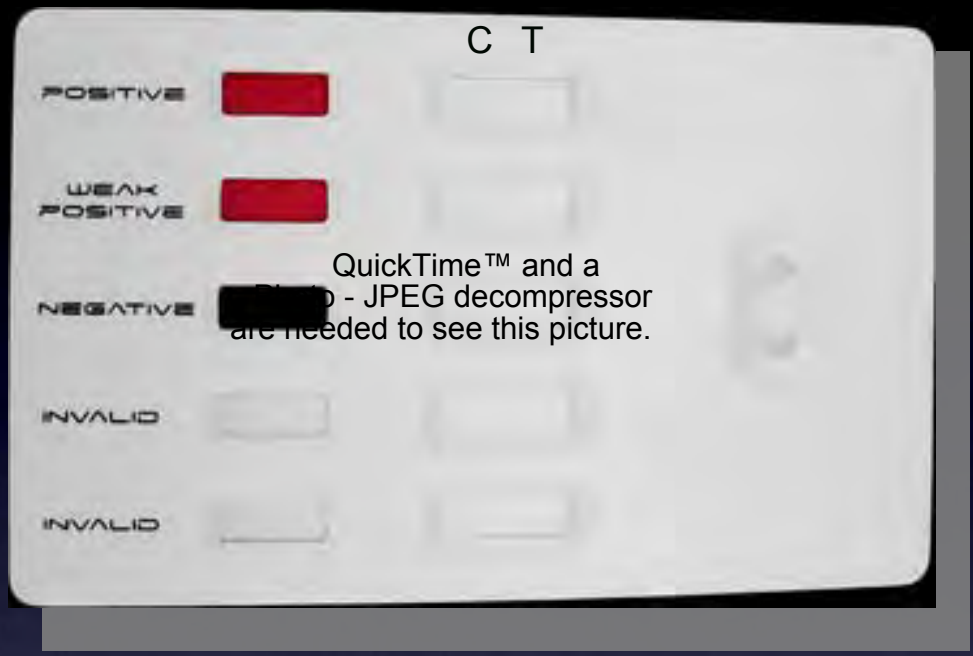
One line present at the control line

## Invalid

no lines present

Results may appear in as little as 3 minutes, with a maximum run time of 15

# Understanding the Results




**Positive** — Two lines present in the result window.

**Weak Positive** — Two lines present in the result window regardless of the intensity

**Negative** — One line present at the control line

**Invalid** — One line present at the Test line

**Invalid** — no lines present

Results may appear in as little as 3 minutes, with a maximum run time of 15

# Things to Remember when doing Business in (h)omeland (s)ecurity

**Training Session 9**

**2008 US Department of Homeland Security**

**S&T Stakeholders Conference - West**

**David Olive - Rich Cooper – Dave McWhorter**
**Olive, Edwards & Cooper**

**January 14, 2008**

# Today's Presentation

- Fundamental Concept of Homeland Security
- Today's Homeland Security Realities
- Misconceptions of the Marketplace
- Tips &Tools for Success
- Questions you should ask this week
- Questions and Answers

# Fundamental Concept

***"It's not just some of us – It's all of us"***

- ***Homeland Security is not a federal activity – it is a national effort that requires every sector to work together with respect, cooperation and open communications.***

# Today's Homeland Security Realities

- **Homeland security is more than one federal department**
  - **More homeland security work occurs outside of DHS than in it.**
- **Homeland security is an 'All-Hazards' environment**
  - **Mother Nature is also a *terrorist*…**
- **Decentralized marketplace**
  - **Federal, State, County, City, Tribal, Regions, Private Sector, NGOs, Critical Infrastructure, etc.**
  - **International governments view homeland security differently**

# Today's Homeland Security Realities – Cont.

- **Reactive and volatile environment with frequent personnel turnover**
  - **Event driven environment(s)**
  - **Continuous DHS reorganizations**

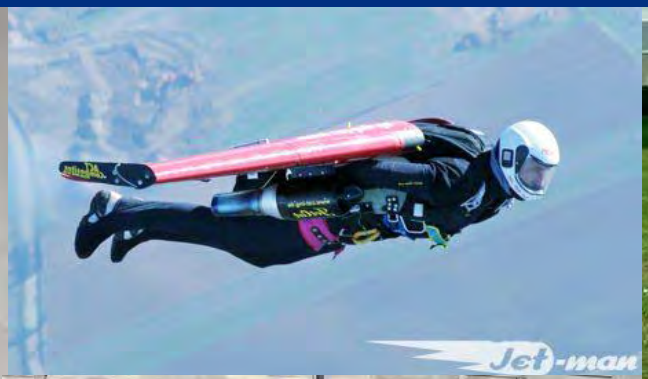
# Some people resist change

# Today's Homeland Security Realities – Cont.

- There is NEVER enough money
  - Limited and extremely competitive dollar pool ($50B+)
- Grant Dollars Requirements/Obligated Funds
  - Don't overlook State & Local decision makers
  - Grants are now under FEMA

# Misconceptions of the Marketplace

- If I Build It, They Will Buy It
  - THEIR needs, not YOUR wants
  - Better than anything on the market vs. good enough



# Misconceptions of the Marketplace – Cont.

- **Customers & Companies/Vendors 'Know-It-All'**
  - Private sector has many answers – but not all
  - Outsourcing is viewed with increasing suspicion
- **DHS is not "DOD domestic"**
  - Nor is it DOJ, DOE or HHS – although the mission may overlap.
  - Federal Acquisitions/Operations may use similar language
- **Single Solution vs. Multiple Solutions**
  - No "one size fits all"
  - What's the existing system and can I work with it, rather than replace it?

# Misconceptions of the Marketplace – Cont.

- **My Senator/Representative Can Make It Happen**
  - **Earmarks are more difficult**
  - **Plus-Ups are even MORE difficult**
  - **NO Senator/Representative can mandate the purchase/use of your product or service**
  - **A congressional inquiry at DHS may, in fact, slow things down**
  - **Possibility of antagonizing those who could buy your product/service**
  - **Contract officers are immune to political pressure**
- **Don't Worry About Standards/Operational Conditions**
  - **Pay attention to ANSI, NFPA, ASME, ASTM, NIST, FCC and other Standards making bodies for current and emerging standards**
  - **Example – Interoperable communications tools must be P25 compliant to secure DHS Grant funds**

# Tips & Tools to Succeed

- ✓ Do Your HOMEWORK
  - ✓ Know the Problem + offer a Solution that is low risk
  - ✓ The Platinum Rule – Be Customer oriented.
- ✓ Know how to get your idea to the right person
  - ✓ S&T is different today than two years ago
  - ✓ More open, more transparent
  - ✓ Rarely is it smart to start at the top of the org chart
- ✓ Look at homeland security as an issue/environment, not as a Department
  - ✓ Greater chance of success by advancing HS mission
- ✓ Use Existing Federal, State and Local Resources to Full Advantage
  - ✓ www.dhs.gov (click on '*Business*')

# Tips & Tools to Succeed – Cont.

- ✓ **Register to do Business with Federal, States and Localities – www.ccr.gov**
- ✓ **Relationships Matter**
  - ✓ **Build new relationships and maximize existing ones with Federal, State, Local and Tribal infrastructure owners/operators and others outside of DHS**
- ✓ ***Don't 'Swallow the Watermelon'***
  - ✓ **Take a Piece at a Time**
- ✓ **Consider Teaming when Pursuing Business Opportunities**
  - ✓ **Homeland security is about 'networks'**
  - ✓ **Competition may be Federal labs and universities**
- ✓ **Read the Grant Guidance – Follow the Money**
- ✓ **Take Meeting Preparations Seriously – Listen, Share and Leverage. Ratio of listening to talking not less than 1:1**
  - ✓ **Your 'point' is more important than your 'pitch' or 'PowerPoint'**

# Tips & Tools to Succeed – Cont.

- ✓ Remember the SAFETY Act – www.safetyact.gov
  - ✓ Know your liability limits, your insurance exclusions, your company's tolerance for risk
  - ✓ Don't assume it will come automatically with a contract – IT WILL NOT!
  - ✓ Use SAFETY Act as leverage vs. competitors
- ✓ Emergency Preparedness/Business Continuity Planning
  - ✓ ANSI/NFPA 1600 / HSPD-20
  - ✓ Wal-Mart style private sector solution
- ✓ Patience is a Virtue, Pushiness is Not

# Tips & Tools to Succeed – Cont.

- **Don't be Overboard**
  - **Does DHS need an all-terrain office chair when a regular one will do?**

***IDEA - Don't offer a Cadillac when they need a pick-up truck***

# Don’t forget…

- ***In homeland security, there are no easy problems, sales or solutions but there are enormous opportunities to contribute every day.***

# Questions you should ask this week

**The "Bakers Dozen" plus one:**

- **What is the problem you are trying to solve?**
- **Is my understanding of the problem consistent with yours?**
- **How do you define success?**
- **What is the timeframe to achieve success?**
- **Who (else) should I talk with?**
- **Who (else) can influence your decisions?**
- **Does the Government want a single solution or multiple solutions?**
- **What are outside pressures and drivers?**
- **What does OMB think of this?**
- **How will GAO and the IG look at this?**
- **What is the Budget? [NEVER ASK THIS QUESTION FIRST!!!]**
- **Do you anticipate any procurement restrictions?**
  - **e.g. EAGLE, Small Business, 8(a), Labs & Universities, Int'l partners, etc.**
- **Is anyone else working on this?**
- **Is this a 'good fit' for me and my company?**

# Questions and Answers

# Contact

**David Olive - Rich Cooper – Dave McWhorter**

**Olive, Edwards & Cooper, LLC**

**1101 17th Street, Suite 607**

**Washington, DC 20036**

**dolive@olive-edwards.com**

**(202) 467-8205**

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**(202) 331-3026**

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**(202) 331-3028**

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&

GOVPLACE®
Enterprise IT Integration

# Grants to Fund Your Homeland Security Projects

Michael Paddock, CEO
Grants Office LLC
Sean Burke, President
Govplace

LA County Firefighters - FEMA Photo

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# Trends in Homeland Security Funding

- Increased focus on urban areas
- Increased funding for transit and port security
- Ongoing funding for Interoperable Communications extending PSIC
- Sustained support for R&D
- More competitive distribution of funds

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# Types of Funding Opportunities

- Real ID
- Disaster Prepardness
- Center of Excellence
- Fusion Center Growth
- Critical Infrastructure

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# Top 5 **DOs** in HS Funding

**DO**

1. **Read guidance documents carefully**
2. **Develop your plan in writing and be ready to provide it to SAA representatives, UAWG members, and others**
3. **Align projects with the NPG and other standards and goals, as appropriate**
4. **Attend state-run sessions on the process**
5. **Coordinate your funding and apply to as many sources as you can**

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# Top 5 **DON'Ts** in HS Funding

**Don't**

1. **Assume "it's too political"**
2. **Try to go it alone**
3. **Overlook programs that are already being applied for and received by your community**
4. **Include letters of support that don't articulate a real commitment on the part of the sender**
5. **Make a request for a specific amount without a clear idea of the parameters of available funding**

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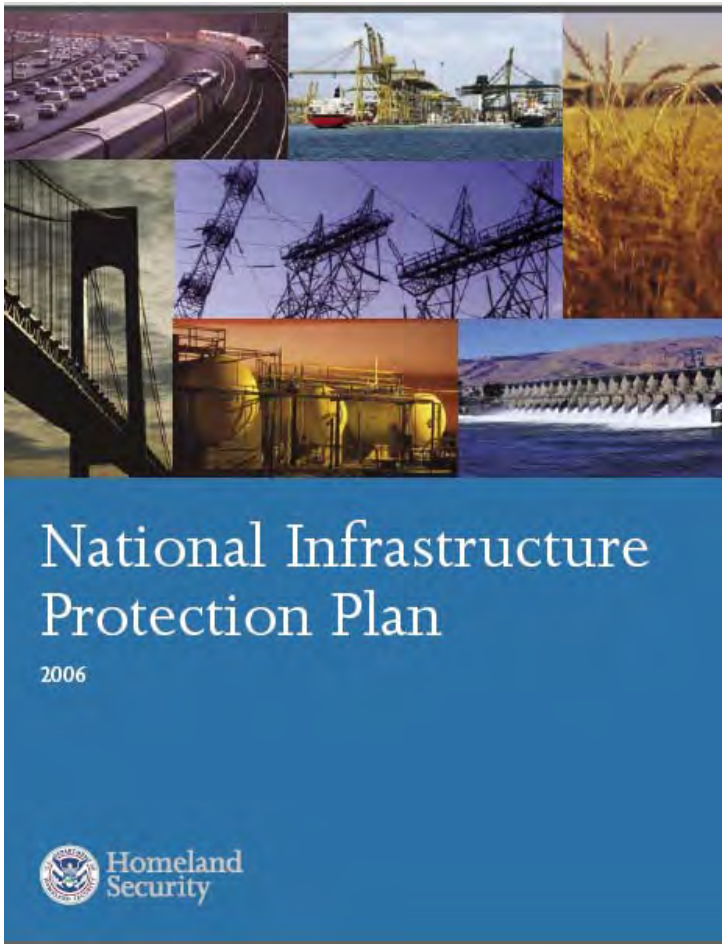
# Coordinating Funding

- Look more broadly than the DHS requirements for coordination:
  - Economic Development
  - Education
  - Water and other infrastructure security
  - State grants
- Technologies to facilitate coordination of funding are often necessary, but not sufficient to achieve full coordination

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# IT and Firstsource Relevance

- FS is applicable to what the S&L entities are trying to accomplish from a variety of standpoints
- i. Interoperability / Low Risk
- ii. Security
- iii. Preparedness
- iv. Emergency Response
- v. Continuity of Operations and Disaster Recovery
- vi. Contract pre-competed for competency of contractors
- Vii. Federal Regulations

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# Firstsource Grant Assistance

- planning
- development
- proposal writing
- performance based partnership
- past performance

FS contractors can assist in ensuring that the positioning and strategy they use to secure Grants funding aligns directly with the mission goals and objectives of DHS

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# Information Resources

- DHS Grants Page (www.dhs.gov/xgovt/grants/)
- Department of Justice Grants Page (www.ojp.usdoj.gov/funding/)
- Federal Electronic Grants Clearinghouse (www.grants.gov)
- Grants Office (www.grantsoffice.com)
- HomelandSecurityFunding.info
- *HSToday* Magazine Grants Guide (www.hstoday.us)

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# Contact

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**Sean Burke**

**Govplace**

**(949) 297-4000 X 1106**

**sburke@govplace.com**

# Next Generation Technology Transfer

DHS S&T Stakeholders Conference- West
January 15, 2008

Presented by
Roger London
Chesapeake Crescent Innovation Director
410-340-5335

# Innovation in Tech Transfer

- ***Traditional***
  - ***University tech transfer office***
  - ***Incubators***
  - ***Venture Capital***

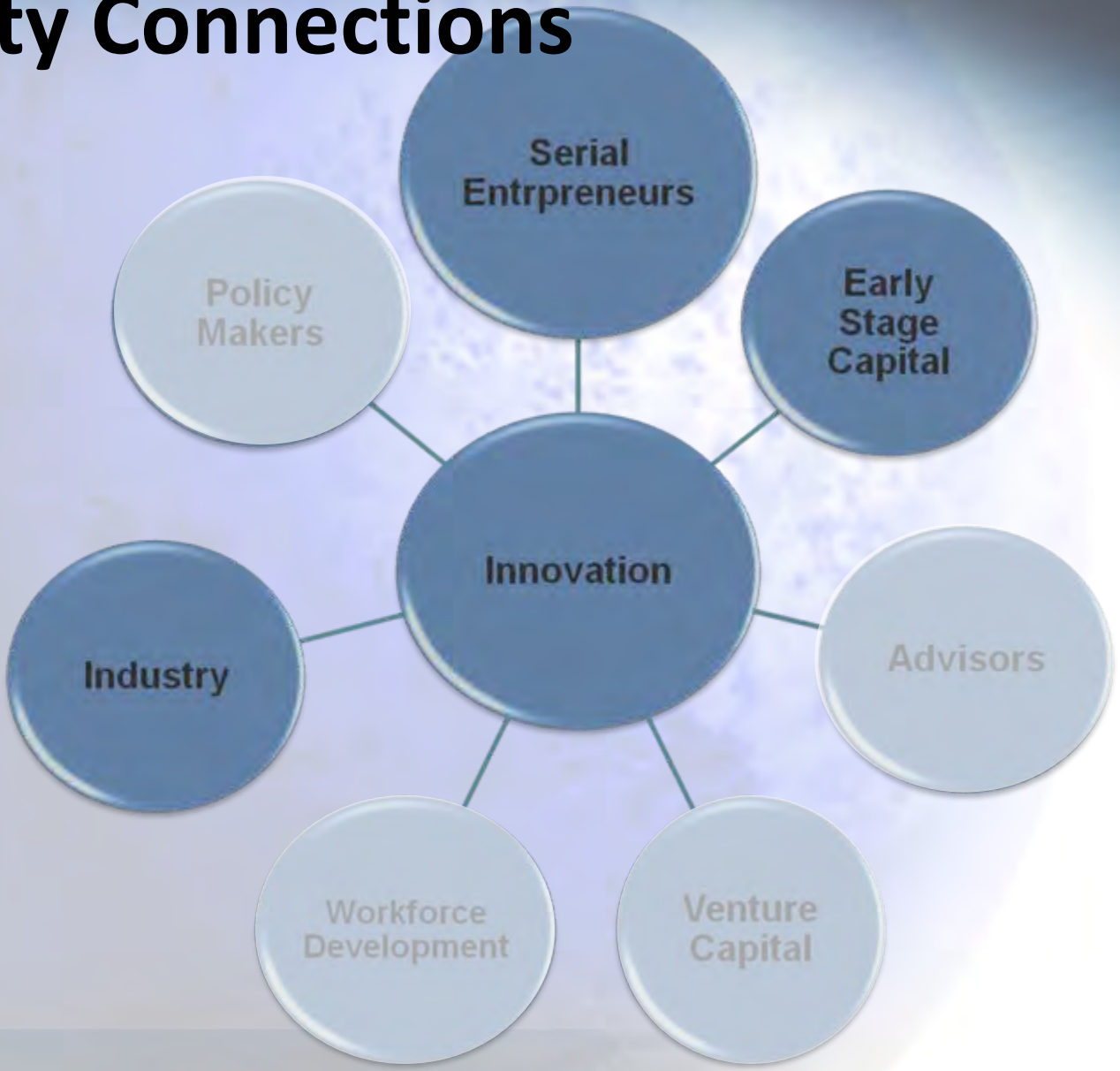
- ***Innovative***
  - ***Clusters***
  - ***Accelerators***
  - ***Tech Scouting***
  - ***Rapid Prototyping***
  - ***Technology Challenges***

# Traditional Tech Transfer Cycle

# Clusters

Serial Entrpreneurs
Policy Makers
Early Stage Capital
Innovation
Industry
Advisors
Workforce Development
Venture Capital

# Priority Connections



# Mini-Clusters

- University of Maryland Baltimore
  - BioPark
- FDA/GSA
  - LifeSci Villages at White Oaks
- Johns Hopkins University
  - Science + Technology Park

# Accelerators

## Watervliet Innovation Center

Kelsey Kohler
Executive Director
44 Dalliba Avenue
Watervliet, NY 12189

www.watervlietinnovation.org
(518) 266-6012
kelseyk@ceg.org

# Tech Scouting

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ARINC

# Shopping list

**Informatics**

- ☐ data fusion
- ☐ data mining
- ☐ info assurance
- ☐ visualization

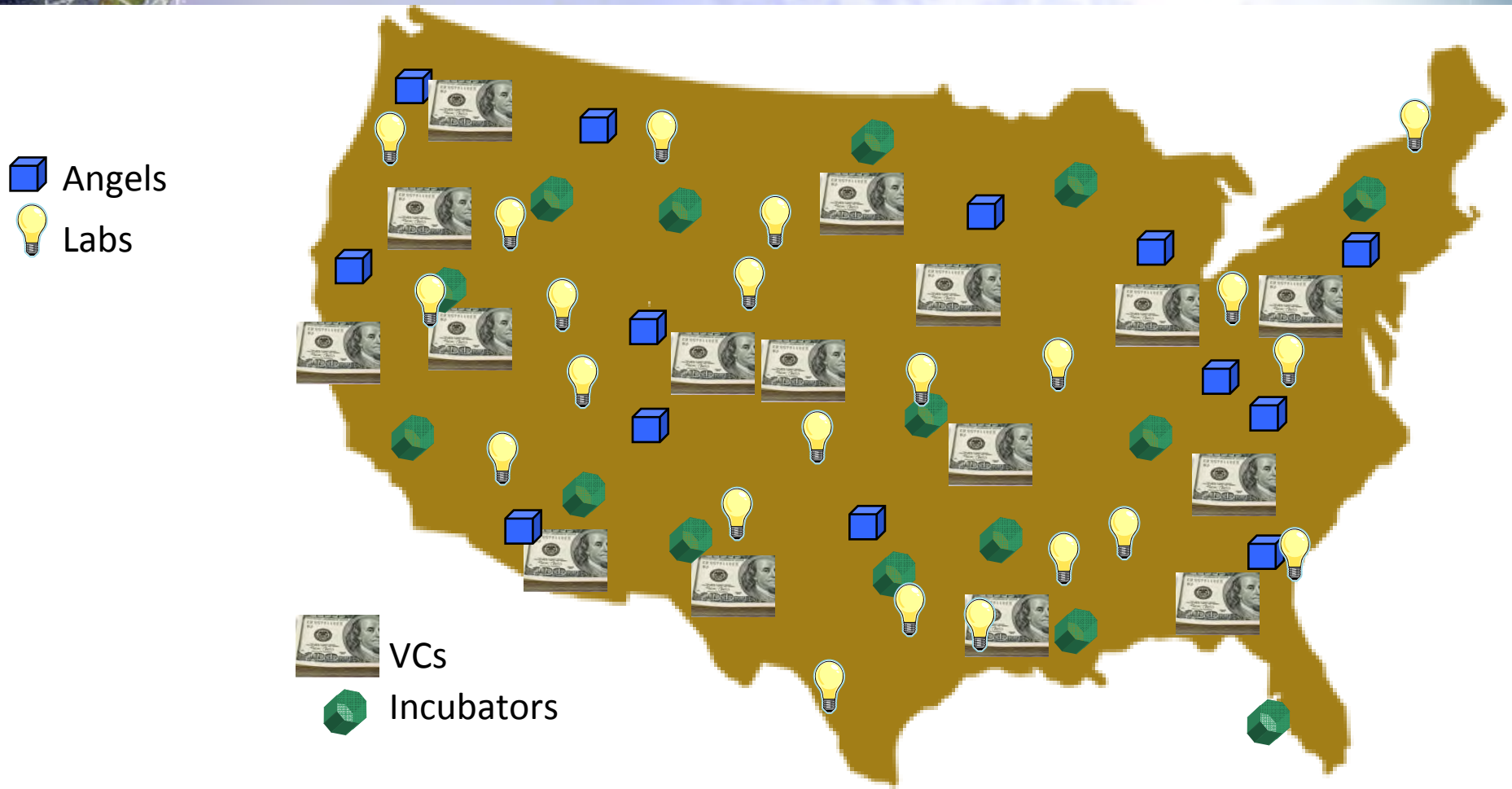
**Ports of Entry**

- ☐ unmanned platforms
- ☐ CBRNE-WMD-IED
- ☐ cargo screening

**Advanced Tech**

- ☐ C4ISR
- ☐ thermal management systems
- ☐ self organizing networks

# Shopping list is distributed



# Technology entered in portal screen

Technology is screened against Client shopping list requirements

Client presented with technologies most likely to match their needs

# Tech Scouting shortens cycles

Step 1

Step 2

Step 3

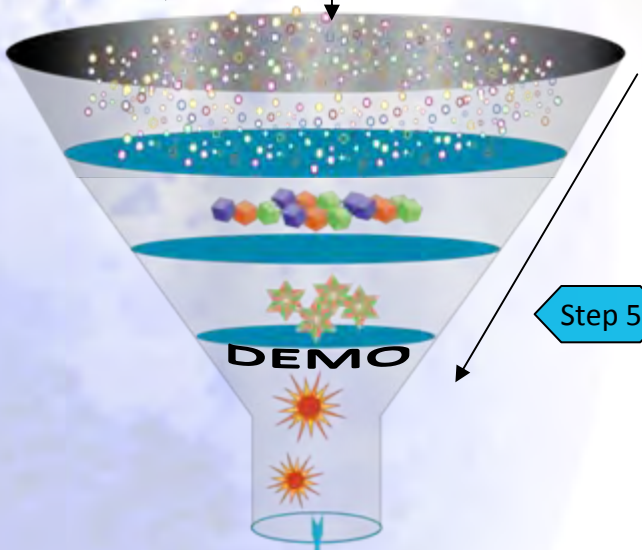
**Shopping List**

**Informatics**
- ❑ data mining
- ❑ authentication
- ❑ visualization

**Advanced Tech**
- ❑ C4ISR
- ❑ fuel cells
- ❑ CBRNE- WMD-IED

Media Embassies Incubators
Service Providers University Labs
Venture Capitalist Federal Labs
Angel Investors CIC Members

Step 4

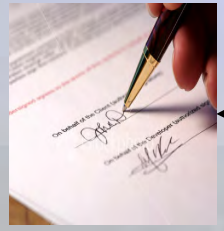



Step 5

NORTHROP GRUMMAN

Client finds solutions
Client saves time
Client saves money
Client saves lives

Step 6



Step 6

# Multi-tasking Equipment

# Cutbacks

# Rapid Prototyping

- ***Identify scope***
  - ***Identify "pain"***
  - ***Technology needs and requirements***
  - ***Test data***
  - ***Success metrics***
- ***Scout***
  - ***Broadcast needs***
  - ***Shadow scenario***
  - ***Use TechBridge to collect***
- ***Filter***
- ***Second phase screen with customer***
- ***Final four***

# Rapid Prototyping- Examples

- ***Data mining and visualization***
- ***Graph database***

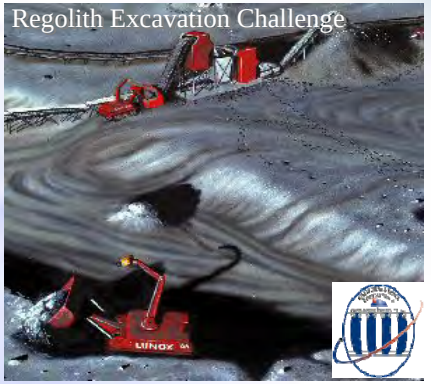
# Challenges

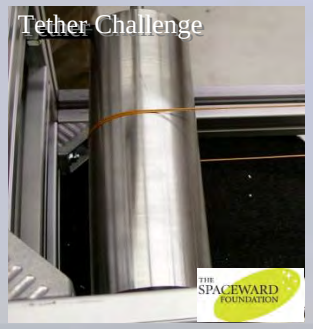
- *X Prizes*
  - *100mpg Challenge (X Prize Foundation)*
  - *Greenhouse scrubber (Branson)*
  - *Movie Suggestions (Netflix)*
  - *Private Moon Shot (Google)*
  - *Wearable Power (DOD*
  - *Personal Air Transporter (NASA)*
- *American Security Challenge (DHS)*

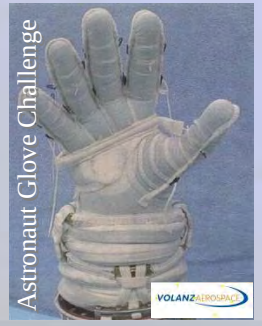
UNITED STATES INTELLIGENCE COMMUNITY

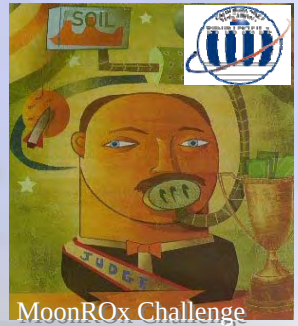
# Funded Centennial Challenge Competitions

| Competition | Total | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| Astronaut Glove | $1M | | 250 | 350 | 400 | | |
| Regolith Excavation | $750K | | 250 | 500 | | | |
| Personal Air Vehicle | $2M | | 250 | 300 | 400 | 500 | 550 |
| Beam Power | $2M | 200 | 300 | 400 | 500 | 600 | |
| Tether | $2M | 200 | 300 | 400 | 500 | 600 | |
| Lunar Lander | $2M | 2,000 | | | | | |
| MoonROx | $1M | 250 | 750 | | | | |





**Roger London**

Chesapeake Crescent Innovation Director

410-340-5335

rogerl@nationalsecurityinitiative.com

Watervliet Innovation Center

CEG

# US Department of Homeland Security

## Science and Technology Stakeholders Conference – West

**Next Generation Technology Transfer**

**January 15, 2008**

Watervliet Innovation Center
CEG

# Accelerators Defined

- **Contrasting support models**
  - Centers of Excellence
  - University Research and Technology Transfer
  - Major Integrators
  - General Incubators
  - Specialty Incubators
  - General Accelerators
  - Specialty Accelerators

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# Joining an Accelerator

- **Do You Need One?**
  - Achieved initial technical milestones
  - Defined business direction (even if preliminary)
  - Need pointed assistance to support your plan of action
  - Lack resources to invest

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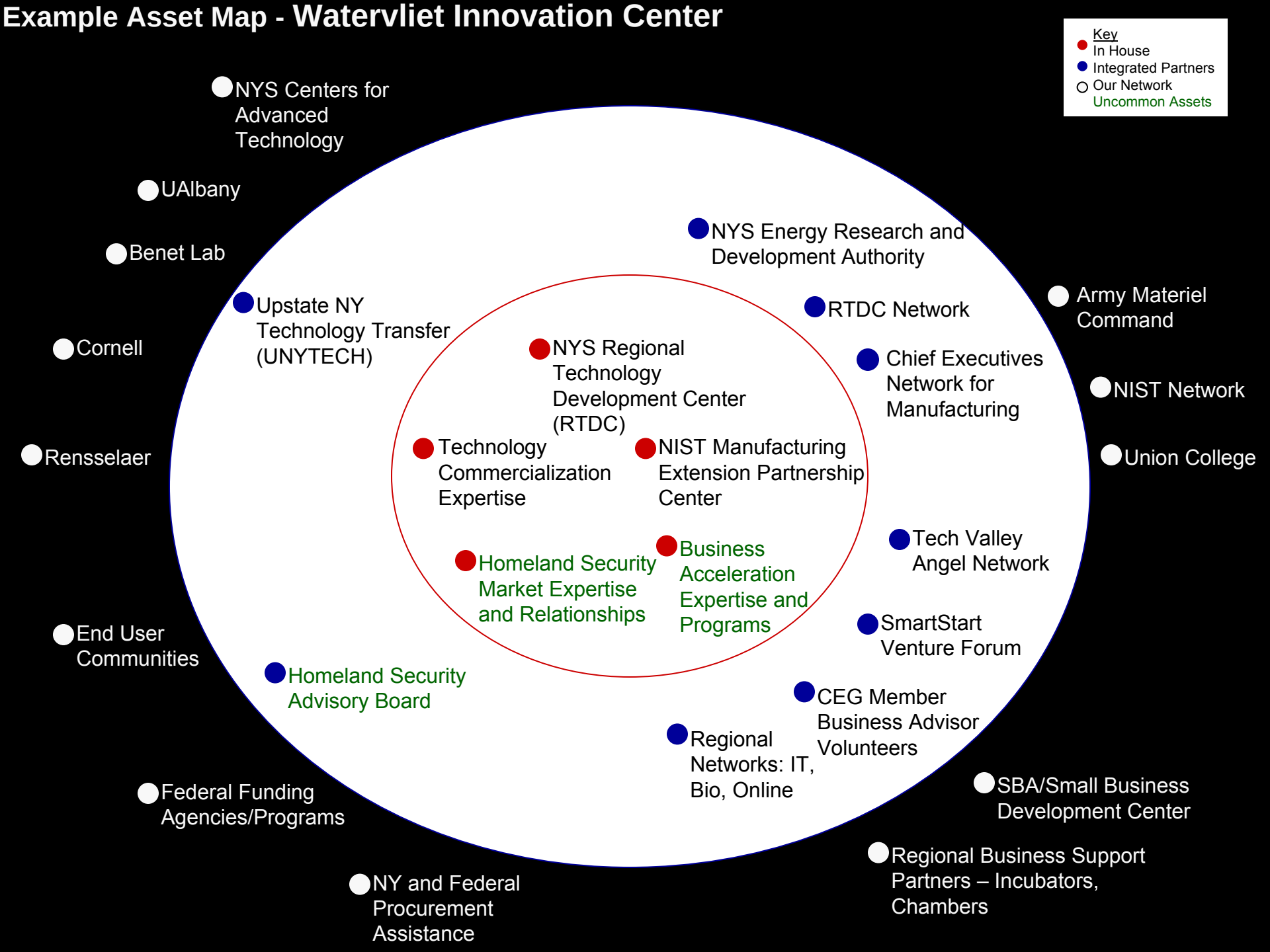
# Joining an Accelerator, continued

- **Selecting a Program**
  - Location
  - Alignment of interests
  - Asset base (in-house and network)
  - Participating companies

- **Successfully Applying**
  - Technical Feasibility
  - Compliance with Program Terms; Needs Fit with Offerings
  - Leadership/Management Experience and Approach/Attitude
  - Homeland Security Market Applicability
  - Intent to Partner
  - Technology Readiness Level; Market Readiness Level; Business Readiness Level

# Example Asset Map - Watervliet Innovation Center



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# Costs and Benefits

- **Costs**
  - Cash, possibly royalties, warrants or future charitable contributions
  - Time, Leadership
  - Brand

- **Benefits**
  - Identify and tackle most significant growth barriers
  - Connect with the right experts and the right time
  - Look and act larger and more experienced than you are

- **Value is extracted, not delivered**
  - Accelerators don’t grow your business, you do
  - Accelerators are the exponent, not the base

    **You determine whether you get $0^{10}$ or $10^{10}$**

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## Contact


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(518) 266-6012
kelseyk@ceg.org

# Better Security via Randomization: A Game Theoretic Approach and its Operationalization at the Los Angeles International Airport

**Milind Tambe, Fernando Ordonez**

CREATE: Homeland Security Center
University of Southern California, Los Angeles

# Objective: Guarantee Randomness of Security Processes While Meeting Security Quality Requirements

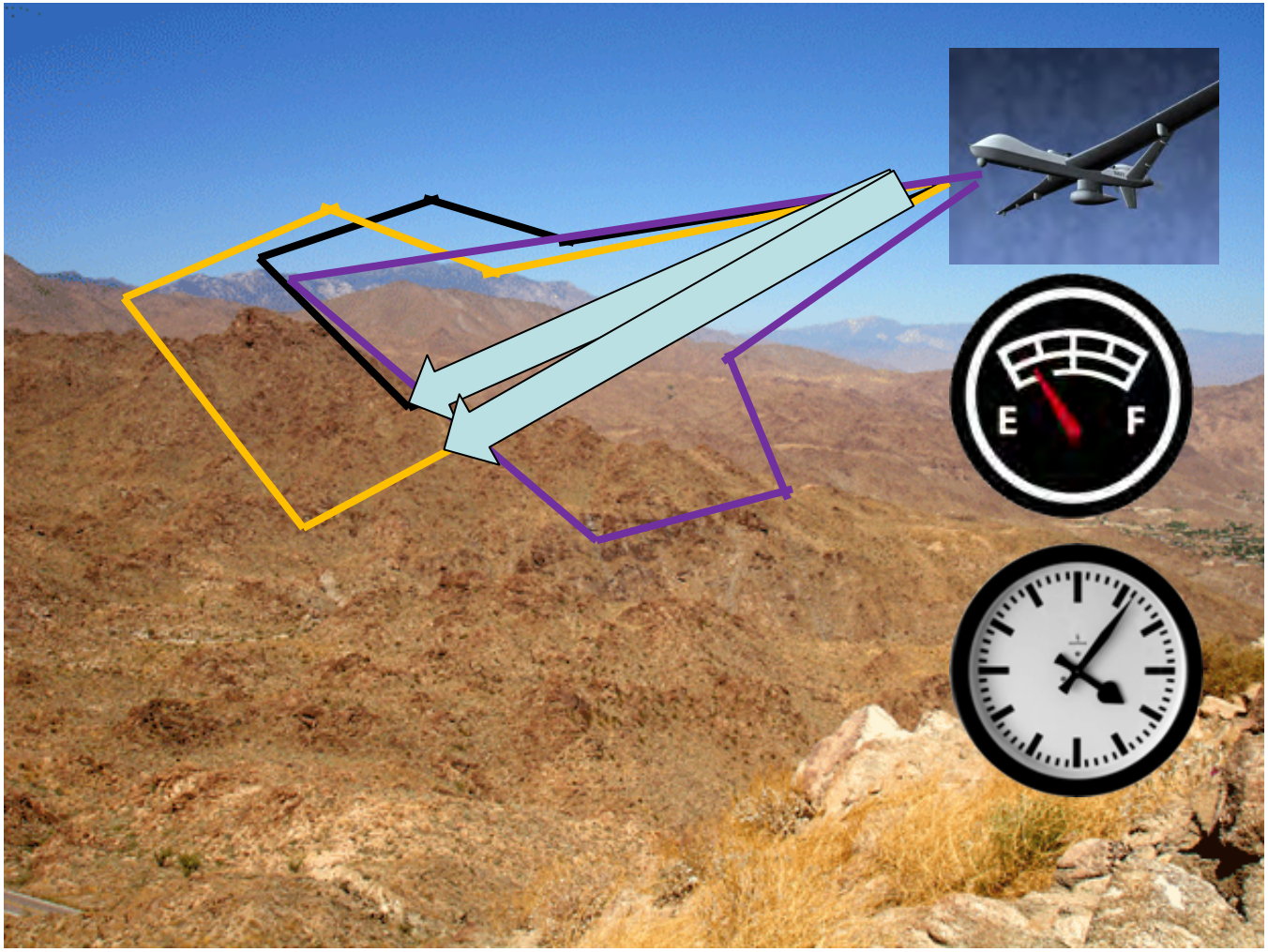
- *Limited /uncertain knowledge of opponent(s)*
- *Opponent monitors defenses, exploits patterns*
- *Examples: Patrolling, aerial surveillance,…*

# Research Problem Definition and Results

- Randomize under uncertain adversarial domains

- Research results:
  - Part 1: Plan randomization with quality constraints
    - *No adversary model, Information minimization*
    - *Decision theory*
  - Part 2: Strategy randomization with quality constraints
    - *Partial adversary models*
    - *Game theory*
  - Part 3: Application to Airport Security

# Part I: No Adversary Model Example

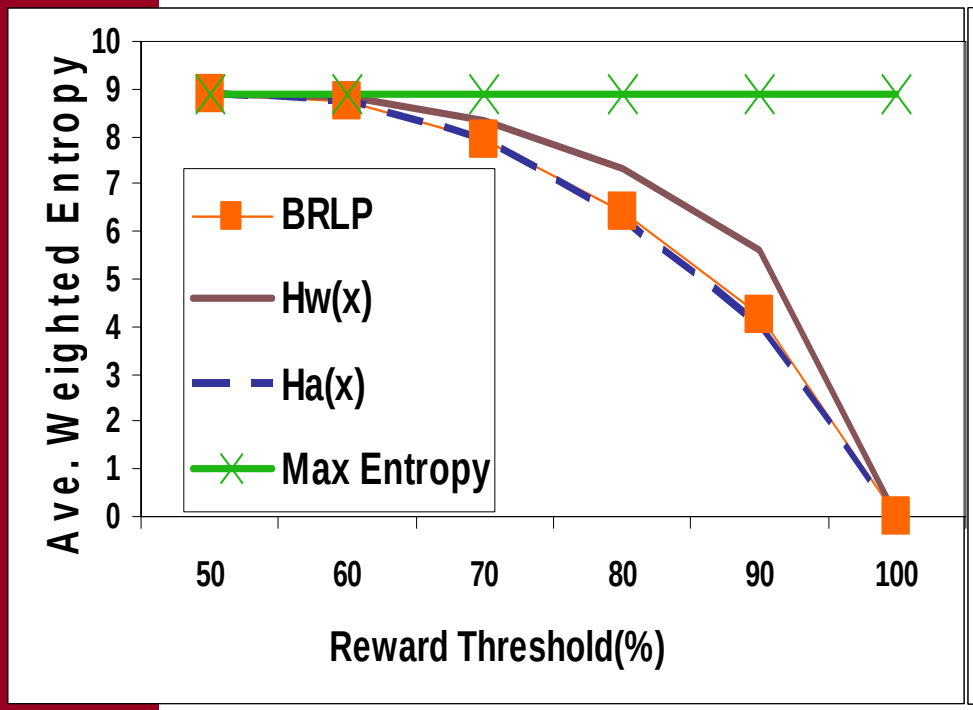


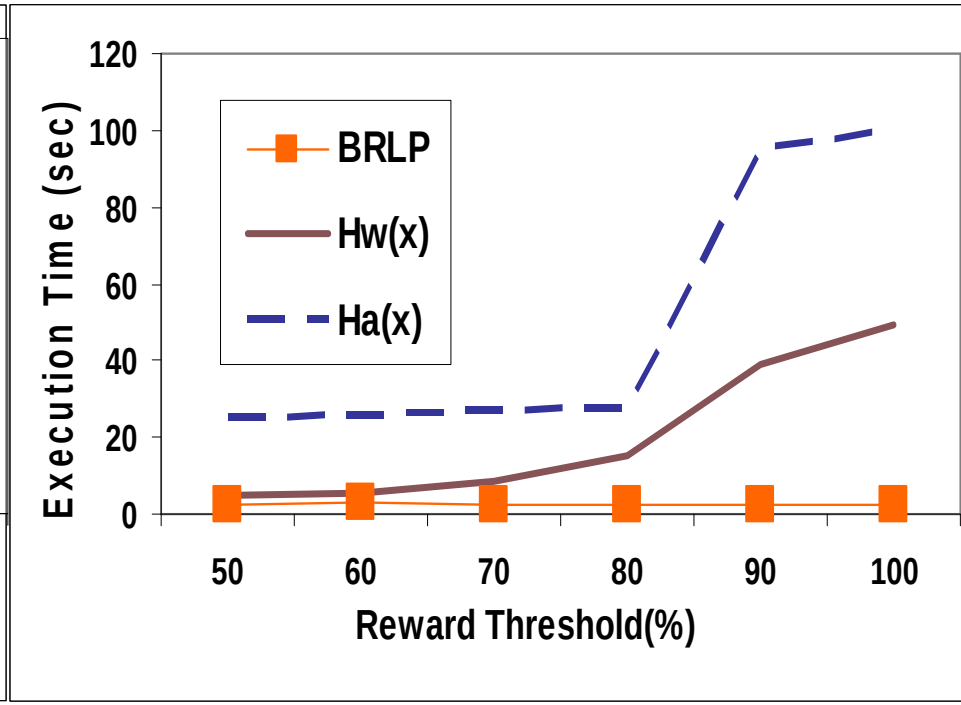
# Part I: No Adversary Model: Information Minimization

- Intentional plan randomization for security
  - *MDP/POMDP: Planning under uncertainty*
    - *MDP: Markov Decision problems*
  - *Difficult for adversary to predict even if knows plan*
- New algorithms: single agent & teams
  - *Reward > Threshold (e.g. fuel)*
  - Non-linear program (inefficient but exact), linear program (efficient but inexact)

# Example Computational Results for Single Agent

*Conclusion: Randomization Recommendation is Computationally Solvable*



# Part II: Security with Partial Adversary Models

Partial model of adversaries:

- *Hardline, well-funded, high capability adversary*
- *Moderate capability adversary*

- How to randomly allocate security resources:
  - k-9 units/officers to terminals

# Part II: Model via Bayesian Stackelberg Game

- Agent (police) commit to strategy first, e.g. canine units to terminals
- Adversaries optimize against police strategy
- Bayesian: Probability distribution over different adversary types

**Adversary**

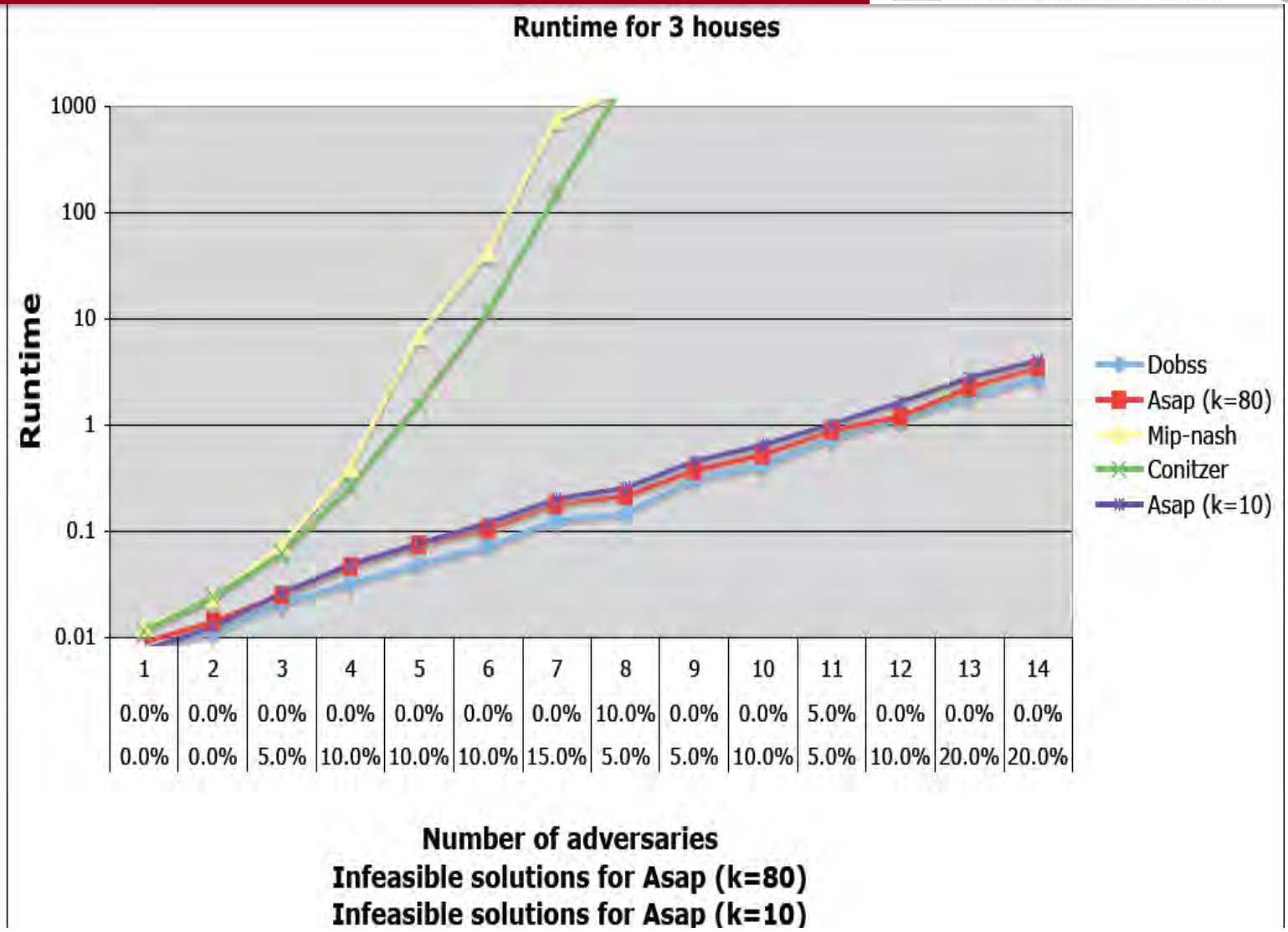
Police

| | **Terminal #1** | **Terminal #2** |
|---|---|---|
| **Terminal #1** | 5, -4 | -1, 3 |
| **Terminal #2** | -5, 5 | 2, -1 |

# Bayesian Stackelberg Game: New Algorithms

- Mixed-integer linear program (MILP)
  1. Exact Solution: DOBSS
  2. Heuristic solution: ASAP
  - *Mixed strategies*
    - Weighted randomization: non-uniform
    - E.g. Not 50%-50% split, but 73%-27% split

- Exponential speedups over prior algorithms




Once again, computational solution feasible

# PART III: Application at LAX

# *Assistant for Randomized Monitoring Over Routes (ARMOR) Project*

***An Interdisciplinary Counter-Terrorism Research Partnership:***

***Los Angeles World Airports & The University of Southern California***

# PART III: Applications

- **Problem**: Setting checkpoints and allocating K9 units?
- **Approach**: Maximize security through mathematical randomization
- **Goal**: Create software assistants

# ARMOR

- Assistant for Randomized Monitoring Over Routes
- DOBSS basis of ARMOR
- ARMOR-Checkpoints
- ARMOR-K9

# ARMOR System

Provide inputs, constraints

Schedule evaluation

ARMOR Knowledge Base

DOBSS: GAME THEORY ALGORITHMS

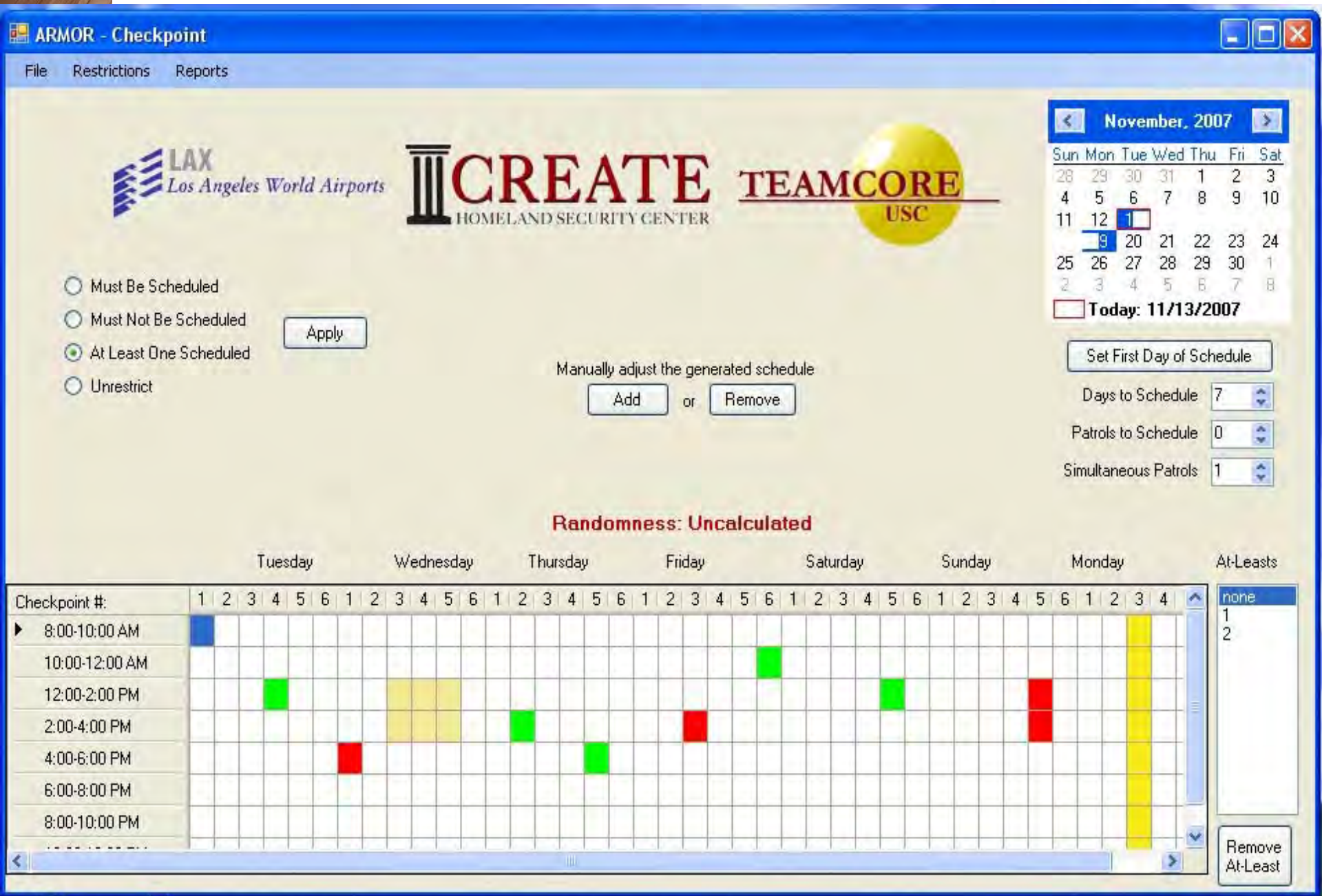
Weights for randomization

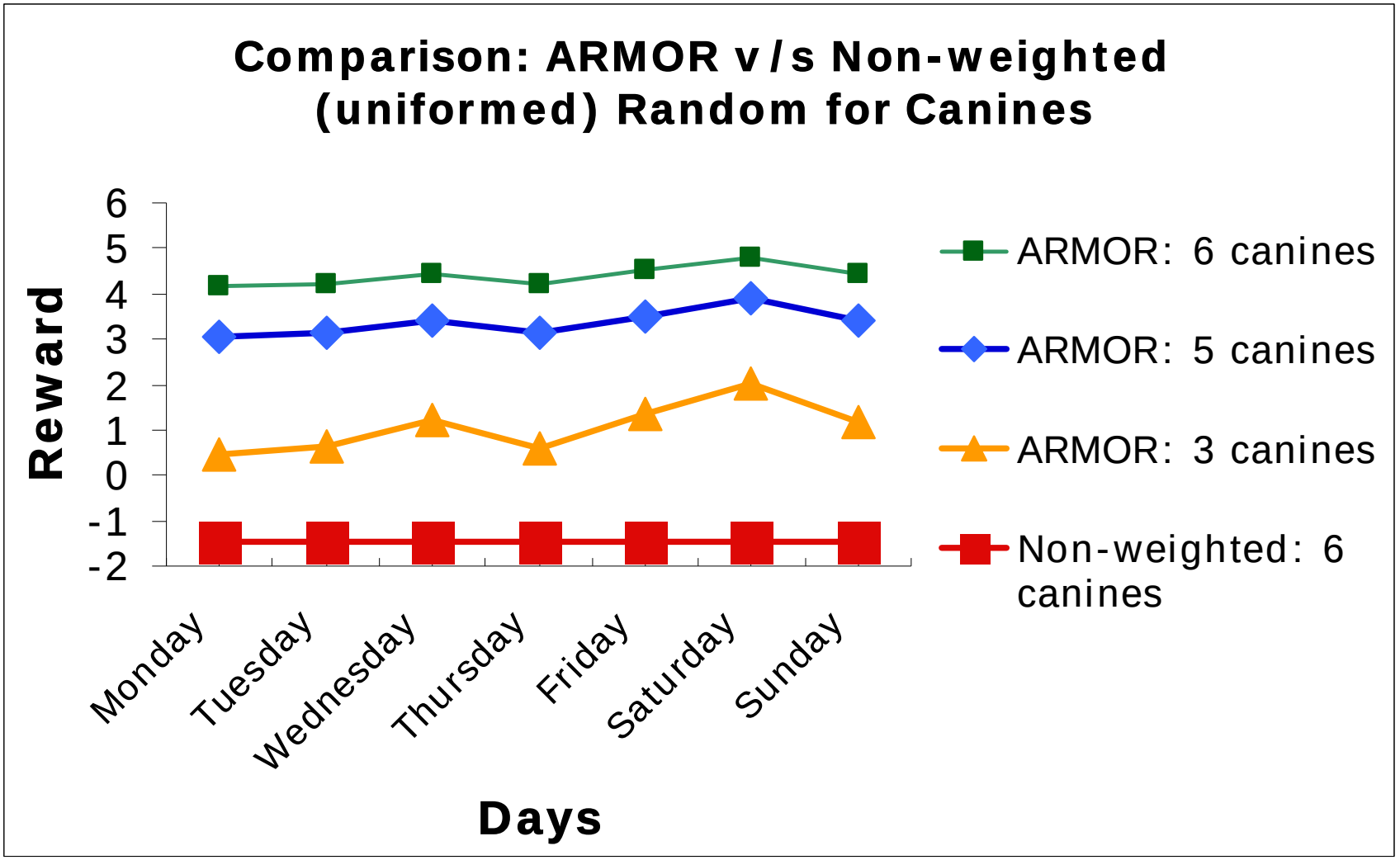
Randomized Schedule generation

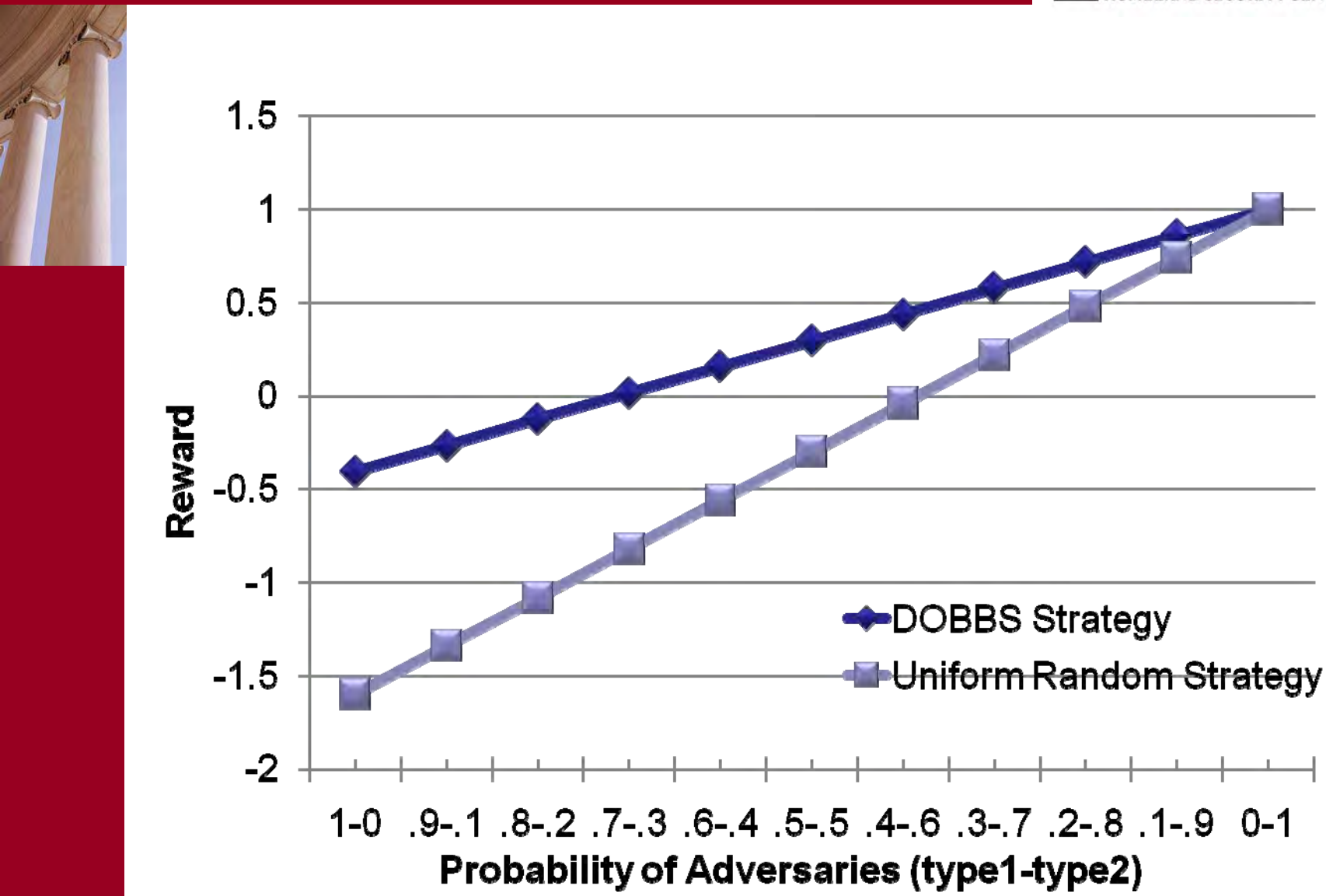
# Knowledge in ARMOR-checkpoint

- *ARMOR-checkpoint base requires knowledge:*
  - Numbers of possible checkpoints
  - Time of checkpoint operation
  - Traffic flow and its impact on catching adversary
  - Estimated target priority for adversary
  - Estimates of cost of getting caught to adversaries
  - Estimates if “different types” of adversaries and their probabilities (e.g. differ in their capabilities)

- *Converted into utilities*


ARMOR - Checkpoint
File
Restrictions
Reports
LAX
Los Angeles World Airports
CREATE
HOMELAND SECURITY CENTER
TEAMCORE
USC
November, 2007
Sun Mon Tue Wed Thu Fri Sat
Today: 11/13/2007
Must Be Scheduled
Must Not Be Scheduled
At Least One Scheduled
Unrestrict
Apply
Manually adjust the generated schedule
Add
or
Remove
Set First Day of Schedule
Days to Schedule
Patrols to Schedule
Simultaneous Patrols
Randomness: Uncalculated
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Monday
At-Leasts
Checkpoint #:
8:00-10:00 AM
10:00-12:00 AM
12:00-2:00 PM
2:00-4:00 PM
4:00-6:00 PM
6:00-8:00 PM
8:00-10:00 PM
none
Remove At-Least


Comparison: ARMOR v/s Non-weighted (uniformed) Random for Canines
Reward
6
5
4
3
2
1
0
-1
-2
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Days
ARMOR: 6 canines
ARMOR: 5 canines
ARMOR: 3 canines
Non-weighted: 6 canines


1.5
1
0.5
0
-0.5
-1
-1.5
-2
Reward
DOBBS Strategy
Uniform Random Strategy
1-0
.9-.1
.8-.2
.7-.3
.6-.4
.5-.5
.4-.6
.3-.7
.2-.8
.1-.9
0-1
Probability of Adversaries (type1-type2)

USC

CREATE
HOMELAND SECURITY CENTER

## September 28, 2007

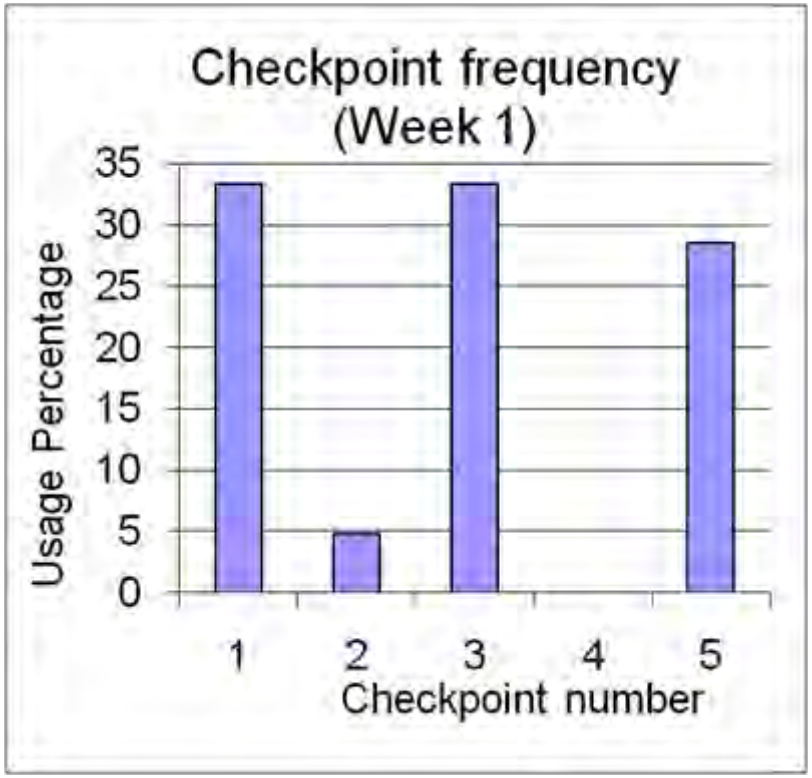
Newsweek National News

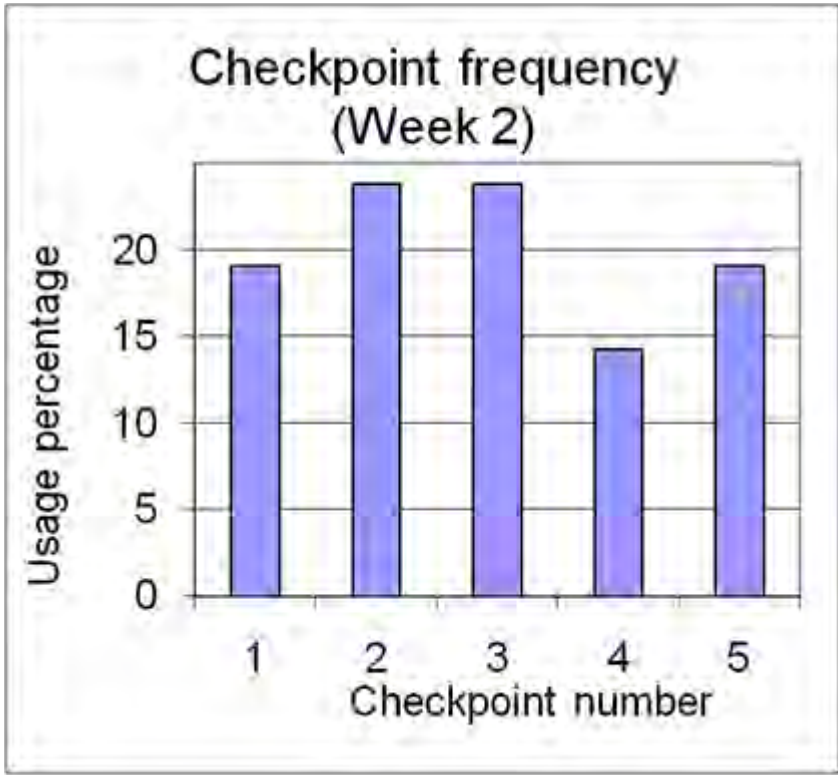
# The Element of Surprise

**To help combat the terrorism threat, officials at Los Angeles International Airport are introducing a bold new idea into their arsenal: random placement of security checkpoints. Can game theory help keep us safe?**

Security forces work the sidewalk at LAX

# Checkpoint Frequency



# Conclusion

- New algorithms: guarantee randomness while meeting quality requirements
- Computational techniques that allow practical applications
- Initial demonstration with LAX working well

# THE END

# RISK COMMUNICATIONS AND PUBLIC WARNINGS

**"Brief-out from the July Workshop"**

**Dennis S. Mileti, Professor Emeritus**
**University of Colorado at Boulder & START-DHS Center University of Maryland**
**2008 Homeland Security Science & Technology Stake-holder's Conference-West**
**Los Angeles, California**
**January 14, 2008**

# *WORKSHOP PURPOSE*

- **Bring Together Experts:**
  - Researchers & Practitioners
- **Summarize Knowledge**
- **Catalogue Applications Needs**
- **Create Future Agendas for:**
  - Research
  - Applications
- **Develop Partnerships:**
  - Across Research Disciplines & DHS Centers
  - Between DHS & Other Federal Research Agencies

# *REGARDING….*

- **Public Preparedness Education**
- **Public Warning Response**
- **Warning System Preparedness**
- **Adoption of State-of-the-art Warning Practices**
- **Pre-event Public Risk Perception**
- **Warning Delivery Technologies**

# *TODAY'S PRESENTATION*

- **Summarize Some Highlights:**
  - I can't cover everything in 45 minutes
- **Review Research Findings for Public Risk Communication Practice:**
  - Evidence-based applications to support this aspect of emergency response practice
- **Emphasize Workshop Topics of Greatest Interest to First Responders**

# *WHAT TO GET FROM MY TALK*

- **DHS is Funding Research to Support First Responder's Work**
- **Some Researchers are Generating Knowledge you can Use**
- **You have Researcher Colleagues you Probably Haven't Met**

# *FUNDAMENTAL QUESTION*

- **How do you Help People to:**

**STOP….**

**HEAR….**

**& TAKE ACTION FOR….**

# TECHNOLOGICAL EVENTS

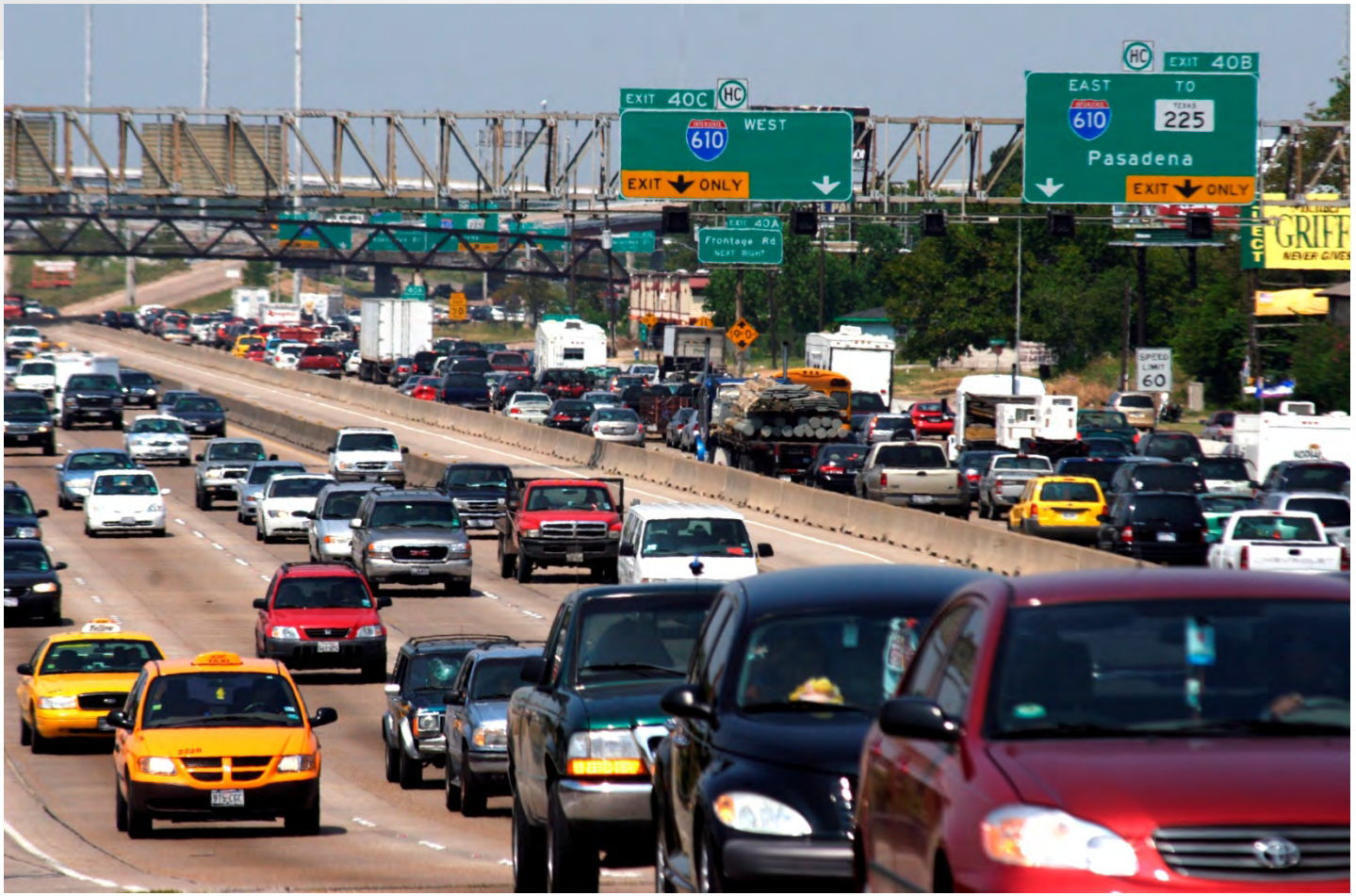
# NATURAL HAZARDS

# TERRORIST ATTACKS

# HAZARDOUS MATERIALS AND OTHER TYPES OF EVENTS

***INCLUDING....***

# VEHICLE EVACUATION



# SIDEWALK & STAIRWELL EVACUATION

# SHELTER IN PLACE

# PROTECT BREATHING

# THE RESEARCH SETTINGS

- **Researched for 50+ Years**
- **Across Different Hazards, e.g.,**
  - **Natural:** e.g., Hurricane Camille, Mt. St. Helens Volcano
  - **Hazardous Material Accidents:** e.g., Mississauga, Nanticoke
  - **Technological Events:** e.g., Three Mile Island
  - **Terrorist Attacks:** e.g., 1993 & 9/11 World Trade Center
  - **Building Fires:** e.g., MGM Grand Hotel, Cook County Hospital
- **We Know:**
  - What works & why
  - And how to apply it in practice

# RESEARCH ON PEOPLE IN COMMUNITIES

**Natural Hazards Center**
Institute of Behavioral Science
University of Colorado at Boulder
482 UCB
Boulder, CO 80309-0482

**phone** 303.492.6818
**fax** 303.492.2151

**www.colorado.edu/hazards/**

- **350 Page Annotated Bibliography:**
  - One page per publication includes key findings
- **Available at:** *http://www.colorado.edu/hazards/publications/informer/infrmr2/pubhazbibann.pdf*
- **"Varied" in Quality**

# RESEARCH ON PEOPLE IN BUILDINGS

- **150 Entry Standard Bibliography**
- **“Varied” in Quality**
- **Available at:**

  insert reference here

# *"PEOPLE" KNOWLEDGE TRANSCEND HAZARDS*

- **Why: People Stay People Across Hazards**
- **Same: Determinants of Public Behavior:**
  - Mathematically modeled & we know the equations
  - Equations (& the factors in them) are the same
- **Different: Public Behavior "Outcomes":**
  - Because of different "quantities" for the factors in the equations that determine behavior across events

# *TOPICS COVERED TODAY (workshop subset)*

- **Topic 1: Myths**
- **Topic 2: Alert**
- **Topic 3: Diffusion**
- **Topic 4: Mobilization**
- **Topic 5: Notification & Response**
- **Topic 6: Warning System Preparedness**
- **Topic 7: What's Needed**

# TOPIC 1: THREE MYTHS

# *MYTH 1: PANIC*

- **Non-problem:**
  - Never occurred after a warning
- **Actual Problem:**
  - "We didn't issue a warning so we wouldn't cause a panic"
- **Panic Occurs When:**
  - In a confined space
  - Escape routes are available
  - Think: not enough time for everyone to reach safety
  - Think: non-escapees will die
- **Even then Panic is Rare**

# MYTH 2: "KISS"

- **Definition:**
  - "Keep it simple stupid"
- **Myth:**
  - Applies to public warning information
- **Reality:**
  - Applies to advertising, not warnings
  - People become "information starved"
  - If you don't tell enough, they'll get it elsewhere

# *MYTH 3: CRY WOLF*

- **Public Does Respond After False Alarms**
- **False Alarms are Productive if Explained**
- **Repeated False Alarms Anger Local Government because they Cost Money**
- **Non-response comes from Poorly Worded or Delivered Warnings, Not False Alarms**
- **Exception -- People Ignore Sirens:**
  - If sounded frequently, e.g., for siren tests

# TOPIC 2: ALERT

- Inter-up Ongoing Life
- Get People's Attention
- Capture Your Audience

# PEOPLE DON'T REMEMBER INDICATORS

- **People:**
  - Don't remember the meaning of:
    - Siren signals (wails, whoops, tones)
    - Color codes
  - Don't distinguish between:
    - Advisories, watches & warnings
- **Exception:**
  - When signals/codes are "drilled" into people, e.g., weekly fire drills in schools

# *ALERTING ISN'T SIMPLE*

- **Many Isolate "Themselves" from Information**
- **Some are Isolated by Circumstance, e.g., Poor**
- **Even when Signals Blare, Many:**
  - Think they're "safe" &
  - Disasters happen to other people
- **Different Sub-populations Need Unique Alerts, e.g.,**
  - Hospitals in communities
  - Hearing impaired in buildings
  - Visitors & "out-of-towners"

# *USE "OBTRUSIVE" ALERTS*

- **Grab People's Attention, e.g.,**
  - Turn up lights in a theater
  - Piercing sounds with TV crawlers
- **Wake People Up, e.g.,**
  - Sleeping children & older adults
  - People with hearing loss & under the influence
- **Outside Devices Loose Effectiveness if:**
  - Windows are shut & air/heat is on
  - A 3 minute sounding of a 10 dBC over ambient outdoor siren has a 62% chance of waking someone up
- **Indoor Devices for Rapid Alert at Night:**
  - Or "Special" outside devices
  - Important for, e.g.,
    - Fast moving community event
    - Fire in an apartment or hotel

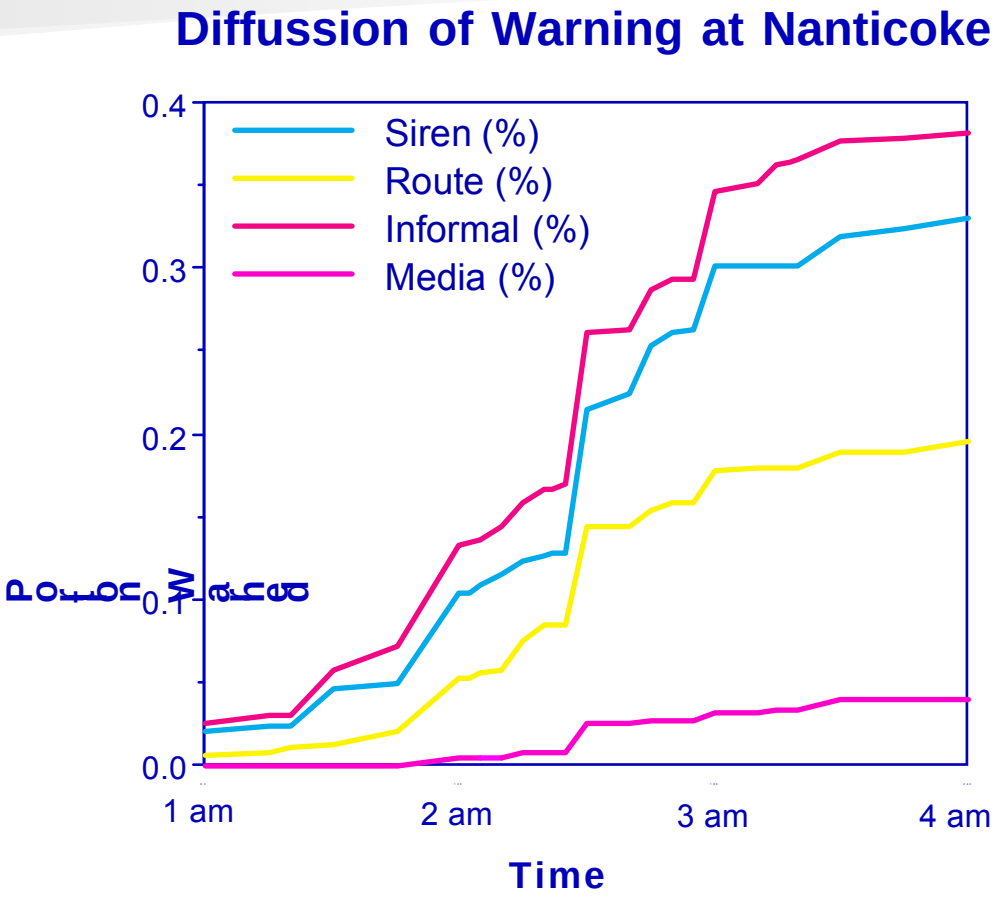
# INFORMAL ALERTING

- **Diffusion of Warnings "Among the Warned"**
- **Always Happens, Count on It, Make Use of It**
- **9/11 Example:**
  - Most in country learned about attack in 1 hour
  - Many in Towers found out a plane hit from friends/relatives
- **Rule of Thumb:**
  - For every 2 formal 1st warnings, there's 1 informal 1st warning
- **Informal Alerting Increasing with New Technologies**

# TOPIC 3: DIFFUSSION

- **Diffusion is "Getting the Word Out"**
- **Warning Diffusion:**
  - A "social process" no matter what technologies are used
  - Different technologies have differential effectiveness
  - Impacted by time of day/night
  - Includes formal & informal notification

# DIFFUSSION DATA EXAMPLE



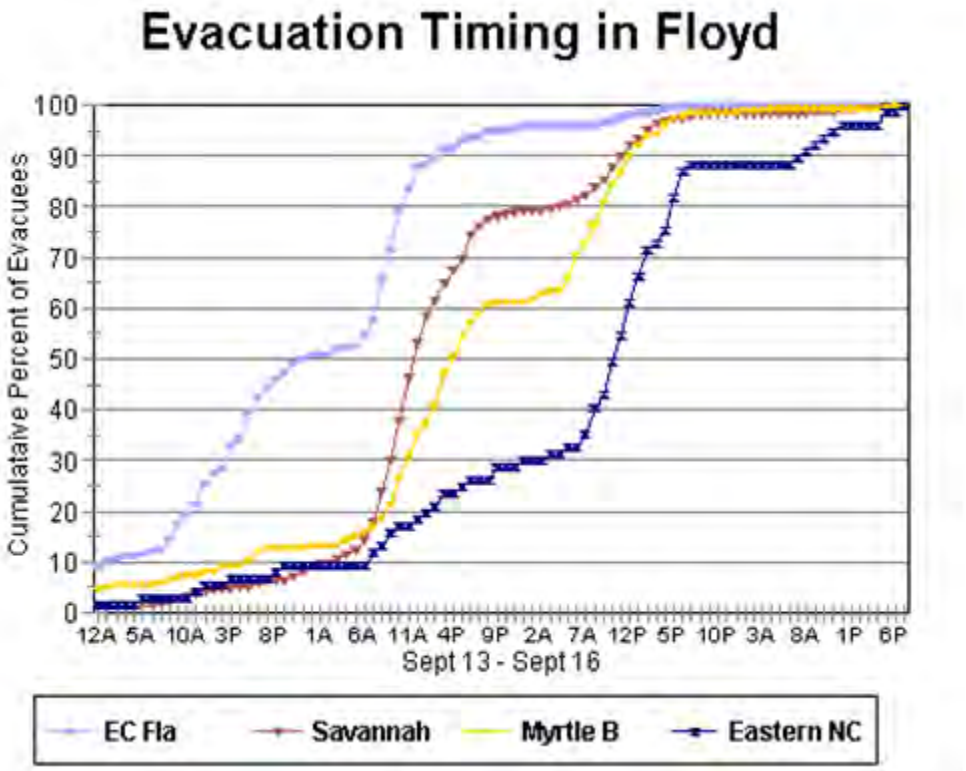
# TOPIC 4: MOBILIZATION

- **Definition: "Time between Getting 1st Warning & Starting a Protective Action"**
- **People Don't All Act at Once**
- **Getting Ready to Respond Delays Response**
- **Why People Delay:**
  - Locate family
  - Gather possession
  - Confirm the warning &/or need to take action
  - Talk things over with others
- **A Few People don't Respond at All**

# A VIEW OF MOBILIZATION

- **Varies by:**
  - Urgency of event
  - Severity of threat
  - Time of day/night
  - Time increases as message quality decreases
- **Non-linear (curved) Relationship between Time & Starting a Protective Action:**
  - Typically an “S” shaped relationship
  - Here’s an example….

# HURRICANE FLYOD DEPARTURE TIMES



# ***TOPIC 5: NOTIFICATION AND PUBLIC RESPONSE***

# PREDICTING PUBLIC RESPONSE

- **Predictions About it Work Best if:**
  - Made on basis of factors that determine behavior (e.g., “A” causes “B”), e.g., science
- **Predictions that Don’t Work:**
  - Predicting from what people did in past events
    - Public behavior varies across events
  - Predicting from “behavioral intention” surveys conducted during non-emergency times
    - Opinions (intentions) & behavior are different
    - Factors that determine warning response behavior:
      - Not operating in a survey
      - Likely unknown to respondents

# *FACTORS THAT IMPACT PUBLIC RESPONSE*

- **Many Statistically Significant Factors Documented by Research**
- **Variation in Importance:**
  - Strong vs. weak effects
  - Real vs. spurious effects
  - Elaborate vs. weak evidence
- **All that Follows is "Highly" Supported**

# *INFORMATION FACTORS*

**“About the Warning Message”**

# FACTOR 1: THE MESSAGE

- **Five Dimensions:**
  - Channel
  - Frequency
  - Content
  - Style
  - Source

# *FACTOR 1: THE MESSAGE (cont'd)*

- **Number of Channels**:
  - The "more the better"
- **Type of Channel**:
  - Personal channels work best
  - The "more the better"
- **Communication Frequency**:
  - The "more" its repeated/heard "the better"
  - Repetition fosters confirmation

# *FACTOR 1: THE MESSAGE (cont'd)*

- **Content:**
  - **WHAT**: Tell them what to do
  - **WHEN**: Tell them when (time) to do it
  - **WHERE**: Say who should do it & who shouldn't
  - **WHY**: Tell about the hazard's consequences
  - **WHO**: Say who's talking (source):
    - There is NO single credible source, so use a panel

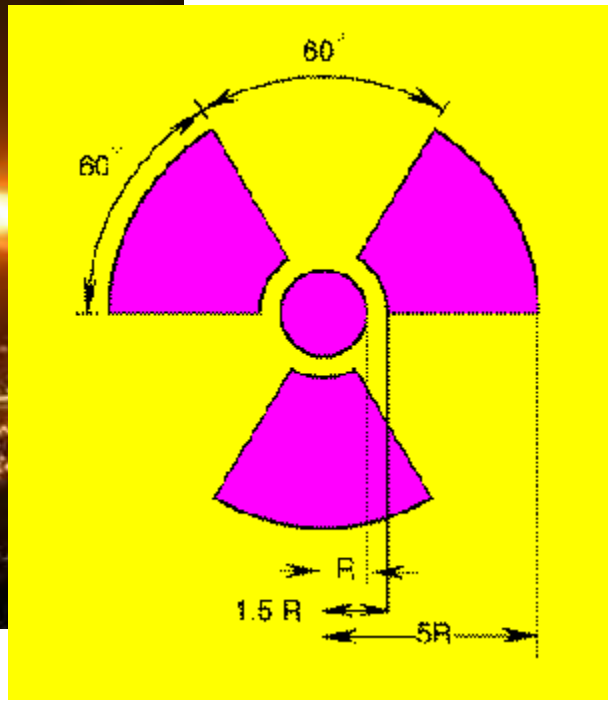
# *FACTOR 1: THE MESSAGE (cont'd)*

- **Style:**
  - **CLEAR**: The more simply worded the better
  - **SPECIFIC**: Precise & non-ambiguous
  - **ACCURATE**: Errors cause problems
  - **CERTAIN**: Authoritative and confident
  - **CONSISTENT**:
    - Externally: Explain changes from past messages & differences from what others are saying
    - Internally: Never say "attack will occur soon, don't worry"

# *FACTOR 2: CUES (Non-verbal Information)*

- **Social Cues Help**:
  - "Monkey see, monkey do"
    - People: Neighbors, Friends, & Relatives
    - Organizations: Government, Businesses, NGOs
- **Physical Cues Help too**:
  - If confirm the risk (rain in flood warnings)

# SOME HAZARDS HAVE CUES & SOME DON'T



# PEOPLE FACTORS

**“About the Audience”**

# *FACTOR 3: "STATUSES" (AS CONSTRAINTS )*

- **Socio-economic Status**:
  - Having little money, education, employment
- **Age**:
  - Being young or old
- **Gender**:
  - Being male
- **Ethnicity**:
  - Being non-Anglo
- **Acculturation**:
  - Not speaking English, born in another country

# *FACTOR 4: "ROLES" (AS INCENTIVES)*

- **Roles of Responsibility for Others:**
  - Having children
  - Larger family size
  - Having pets
  - More kin relationships
  - Family united
  - Greater community involvement

# *FACTOR 5: EXPERIENCE*

- **People "Normalize" Risk Information Received Based on their Personal Experience:**
  - People are inclined to do what was appropriate in the "last" event experienced

# PROCESS FACTORS

- **How Message & People Factors Interact**

# *FACTOR 6: BELIEF*

- **There is "NO" Single Credible Spokesperson:**
  - STOP LOOKING FOR ONE
  - People have different ideas about who's credible
- **You're Asking the Wrong Question:**
  - Many "think" spokesperson credibility = message belief
  - They're different
- **Warning Belief is What's Important & Here's How to Achieve it:**
  - 1. Issue "one message" with "**MULTIPLE** spokespersons":
    - Officials, Red Cross, scientists, familiar newscaster, & others
  - 2. Use **MULTIPLE** dissemination channels
  - 3. Repeat the message **MULTIPLE** times:
    - Repetition fosters belief (discovered in 1952 in advertising research)
- **Here's as Good as Single Spokespersons Get….**

# MOST CREDIBLE SOURCE IN AMERICA (for about 35%)

# FACTOR 7: KNOWLEDGE

- **Multi-faceted Concept Including:**
  - Past: What people "import" into the event
  - Present: What people "think" based on the information/cues they get during the event
  - Natural Inclination: "I'm safe & I don't need to know anything else"
- **Its Not Static and Changes**
- **Manage it in Warning Messages:**
  - Provide warning information that "overcomes" differences in people's:
    - Past, present, & natural inclinations

# *FACTOR 8: PERCEIVED RISK*

- **Perceived Risk "During the Event"**:
  - Different from pre-event risk perception
  - Major roadblock to taking action:
    - "I'm safe" & I'll find information that confirms it, that's what I'll believe, and I'll ignore the warning"
  - People dichotomize risk:
    - Do something/do nothing
    - Its not in proportion to probability estimates
  - Remember:
    - People "Normalize" Communicated Risk

# FACTOR 9: MILLING

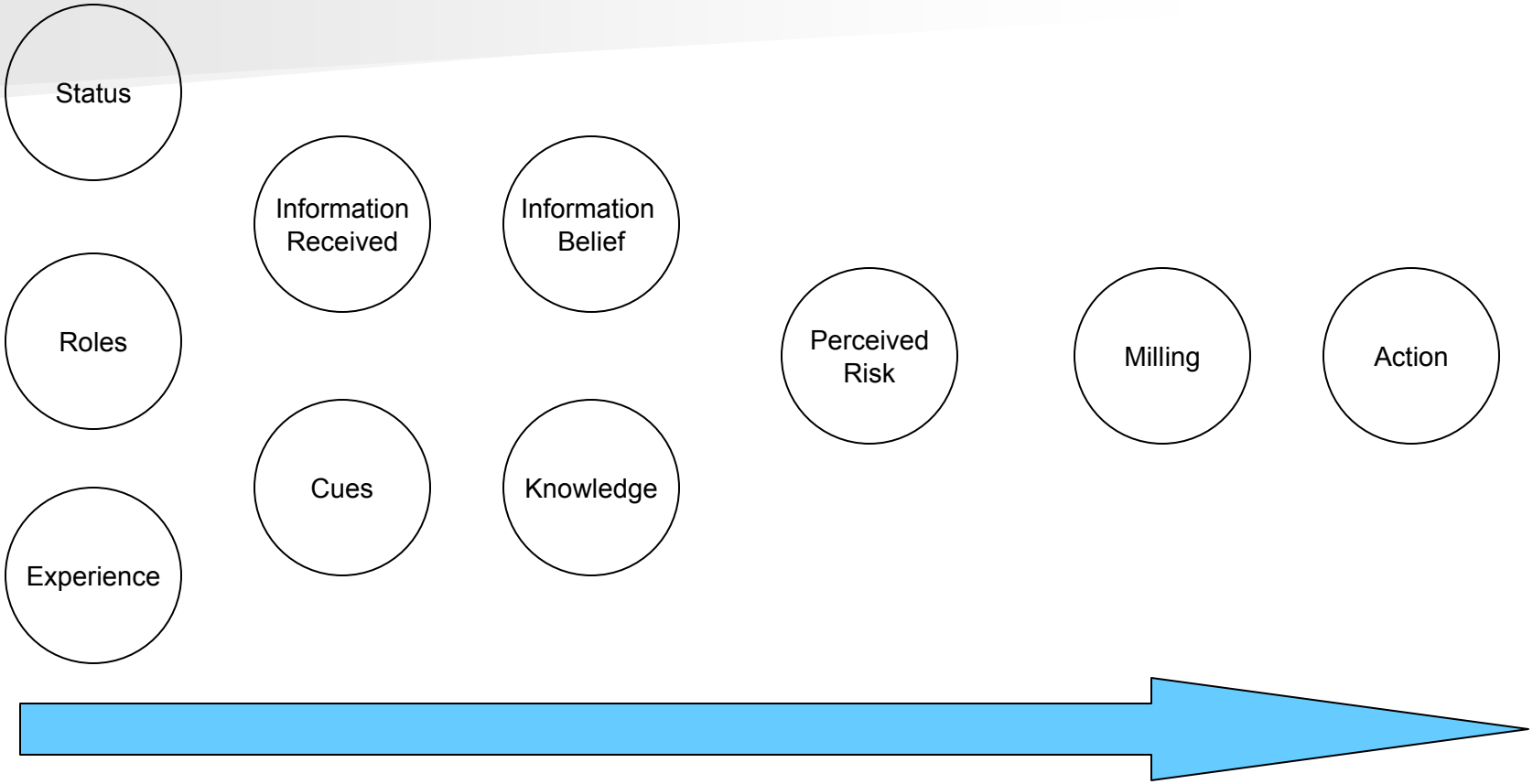
- **Milling/Confirmation**:
  - "Key" to warnings that work
  - Nobody does something because someone tells them to do it
  - People have to think its their own idea
  - Comes from milling (talking about it with others & getting confirming information):
    - Risk & what to do about it needs to be "confirmed" through additional information & talking it over with others

# HOW ALL THESE FACTORS RELATE TO EACH OTHER

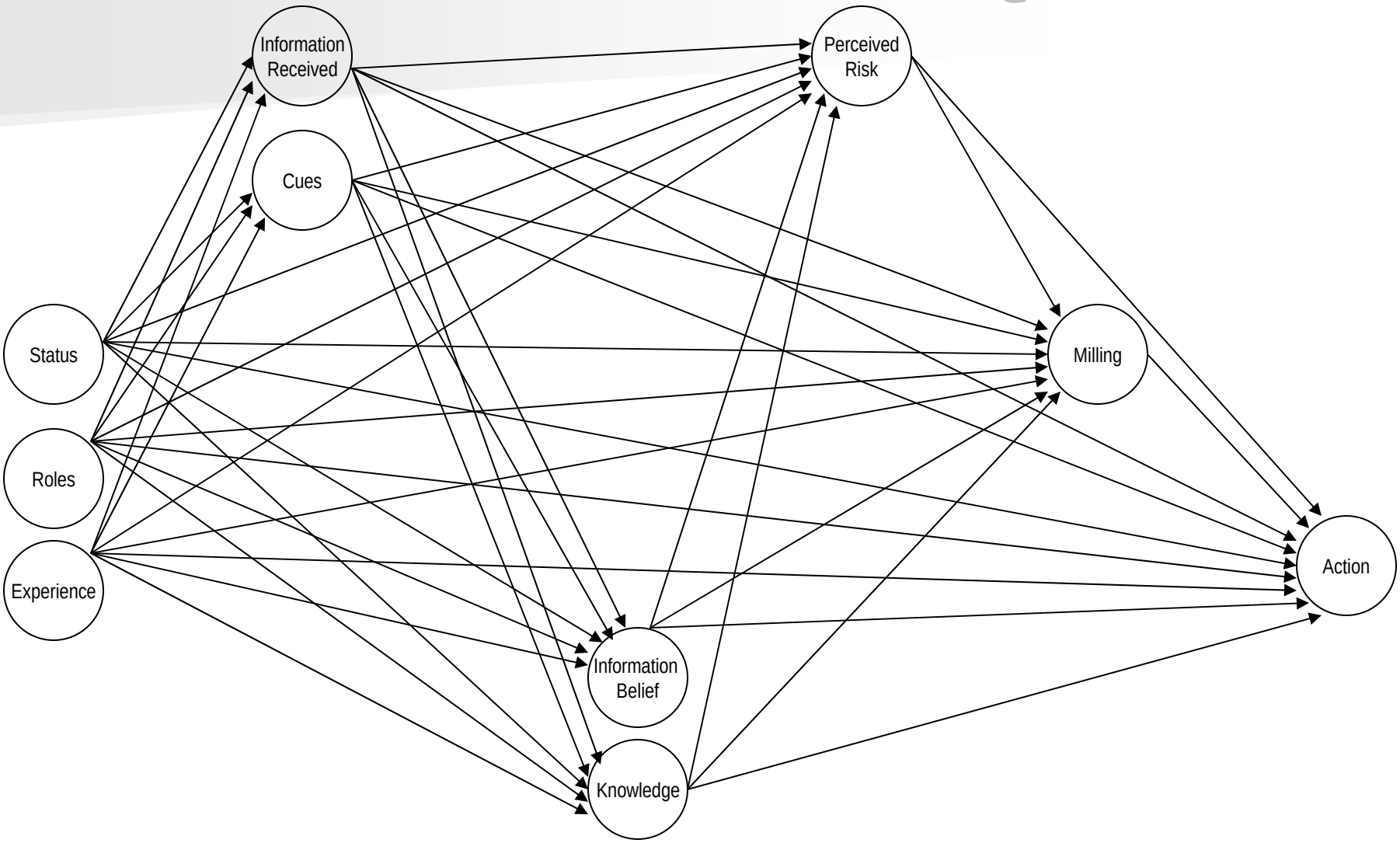
# *SEQUENCED CUMMULATIVE EFFECTS OF FACTORS, e.g.,*

- **Perceived Risk Determined by:**
  - Multiple communications
  - Multiple channels
- **Milling Determined by:**
  - Multiple communications:
  - Multiple channels
  - Perceived risk
- **Warning Response Behavior Determined by:**
  - Multiple communications
  - Multiple channels
  - Perceived risk
  - Milling

# SEQUENCING THE FACTORS



# MODELLING THE SEQUENCE



# CONVERTING THE MODEL TO MATHEMATICS

- **Represented by Equations:**
  - Called a “series of simultaneous multiple regression equations”
- **Can Determine:**
  - The effect of every factor in the model on other factors while controlling for the effects of all other factors (“good” science)
- **Result is:**
  - Can distinguish between what’s really important and what isn’t
- **When to Get Excited:**
  - When different studies reach the same conclusions
  - That’s where we are with research on public response to warnings for hazardous events

# EXAMINE SOME EQUATIONS (WTC Evacuation on 9/11)

$$X4 = \beta 41X1 + \beta 42X2 + \beta 43X3 + e4$$
$$X5 = \beta 51X1 + \beta 52X2 + \beta 53X3 + \beta 54X4 + e5$$
$$X6 = \beta 61X1 + \beta 62X2 + \beta 63X3 + \beta 64X4 + \beta 65X5 + e6$$
$$X7 = \beta 71X1 + \beta 72X2 + \beta 73X3 + \beta 74X4 + \beta 75X5 + \beta 76X6 + e7$$

(cf. Averill, J. D., D.S. Mileti, R.D. Peacock, E.D. Kuligowski, N. Groner, G. Proulx, P.A. Reneke, and H.E. Nelson. 2005. Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Occupant Behavior, Egress, and Emergency Communications. *Report NCSTAR 1-7*, National Institute of Standards and Technology, Gaithersburg, MD.)

Available at: http://wtc.nist.gov/NISTNCSTAR1-7.pdf

# *CONCLUSIONS FROM THE MATHEMATICS*

- All Factors **AREN'T** Equally Important
- Some Factors are **REALLY** Important:
  - What the message says:
    - Especially telling what actions to take
  - Hearing the same thing many times
  - Cues
  - Milling
- Some Factors are **LESS** Important:
  - Demographics (unless information is poor)
- Some Sequences **MORE** Important than Others

# GENERAL OBSERVATIONS

- **Information (Message) Factors:**
  - Largest impact of all factors on public response
- **If Information Factors are High Quality:**
  - Influence of other factors "decrease"
  - Ability to manage public response can be high
  - Example: Nanticoke
- **If Information Factors are Low Quality:**
  - Influence of other factors "increases"
  - Ability to manage public response can be lost
  - Example: Three Mile Island

# GENERAL CONCLUSIONS

- **Sound Public Warning Response is not Likely to Happen Naturally:**
  - Due to innate difference between the people being warned
- **Differences between People being Warned:**
  - Can be overcome by providing good warning information
- **Good Warning Information won't Happen Naturally either:**
  - Requires adequate warning preparedness planning
- **Sufficient Research Evidence Exists to Know What Adequate Warning Preparedness should Include**

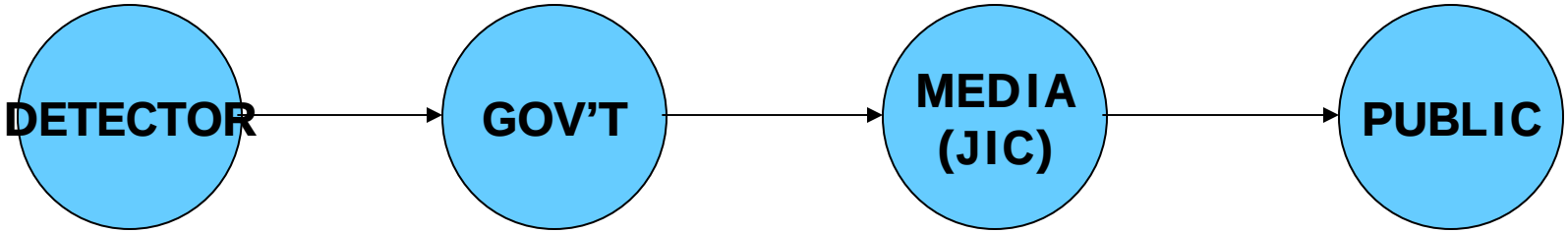
# TOPIC 6: WARNING SYSTEM PREPAREDNESS

- Warning System Preparedness May be Out of Date
- Why?:
  - Society changed
  - Warning preparedness hasn't
- Here's What Changed……

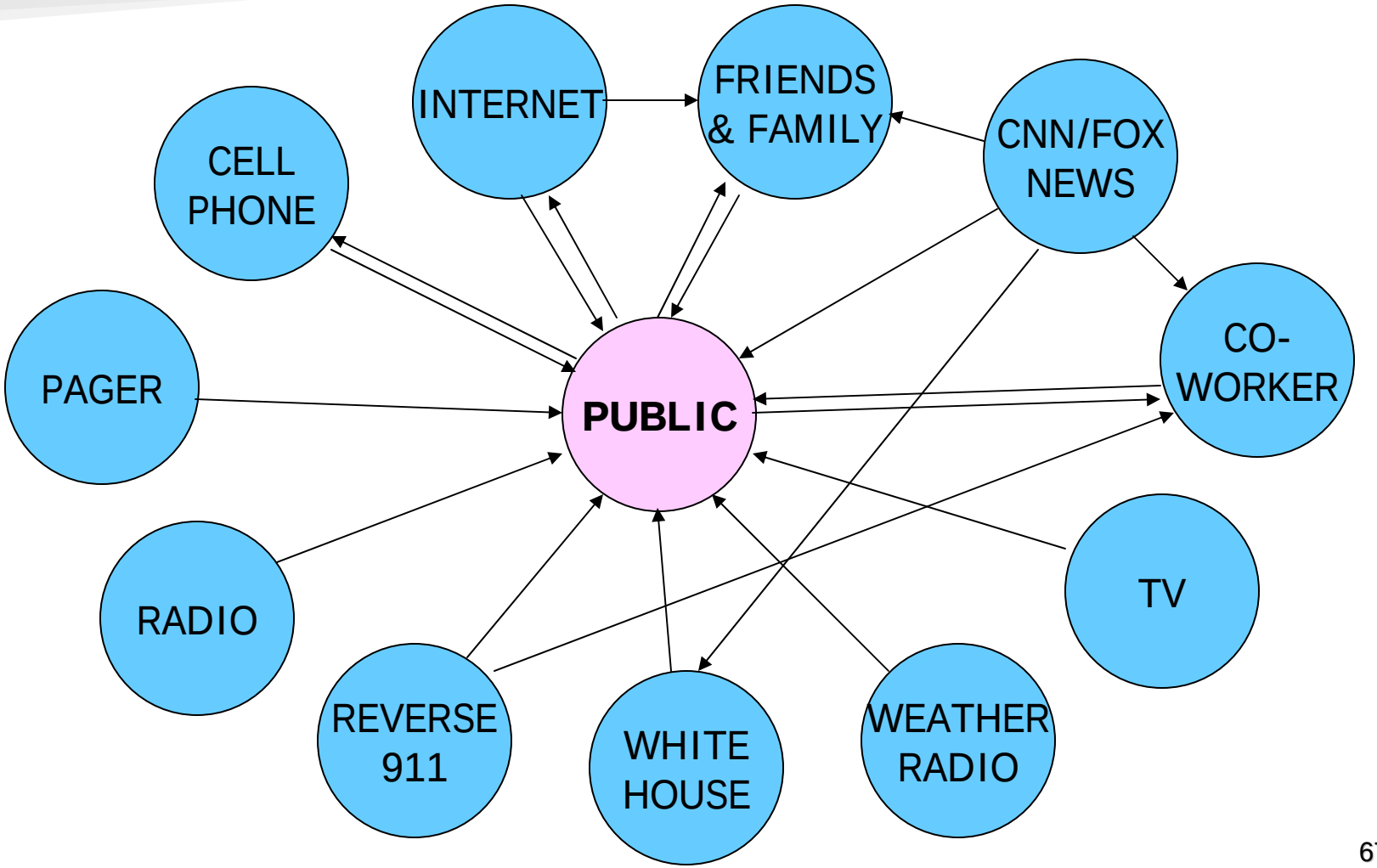
# PUBLIC COMMUNICATION HAS CHANGED "SHAPE"

- **Public Warning Systems of Old:**
  - "Linear" communication systems
- **What's Changed:**
  - Innovations in communication technology
  - Shifts in communication practices
- **Requires Warning Systems Change to:**
  - "Non-linear" communication systems
- **Here's What it Looks Like….**

# ***YESTERDAY: "LINEAR" PUBLIC WARNINGS***



# TODAY: EVERYONE'S WARNING EVERYONE ELSE



# *WARNING SYSTEM PREPAREDNESS*

- **Yesterday….Prepare for:**
  - Emergency alert system messages
  - Press briefings at a joint information center
  - Fire fighter's messages in buildings
- **Today….Be Able to:**
  - Manage a complex public conversation in which everyone is giving/getting information to/from everyone else

# *ONE THING HASN'T CHANGED*

- **Public's Need for Warnings that are:**
  - CLEAR (simply worded)
  - SPECIFIC (precise and non-ambiguous)
  - ACCURATE (no error)
  - CERTAINTY (authoritative and confident)
  - CONSISTENT (within and between messages)
- **About:**
  - WHAT (what to do)
  - WHEN (when to do it)
  - WHERE (who should & shouldn't do it)
  - WHY (the hazard & consequences)
  - WHO (who's giving the message)
- **That are Confirmed:**
  - Same message heard many times

# *AN EXAMPLE OF BRINGING RESEARCH TO PRACTICE*

- **Converting All the Research, Data, and Mathematics into Practice……**

# TOPIC 7: WHAT'S NEEDED

# *MAJOR RESEARCH NEEDS*

- **National Public Response Data Repository**
- **Meta-analysis of Existing Survey Data:**
  - Within & across disciplines & hazards
- **Studies of Public:**
  - Non-evacuation protective actions
  - Response in large urban areas
  - Response to no notice/short notice events
  - Exploration of variation in mobilization times
  - Ending events/all clears
  - Evacuation vs. migration vs. abandonment
- **Penetration of New Warning Technologies**

# *MAJOR APPLICATION NEEDS*

- **Evidence-based Guidance:**
  - How to write effective warning messages
  - Inter-organizational warning preparedness
- **Prototype Warning Messages**
- **Modernize Existing Warning Systems:**
  - New technologies
  - Societal changes since plan development
- **Evidence-based Behavior Assumptions in Protective Action Models**

# *THANK YOU*

dennis.mileti@colorado.edu

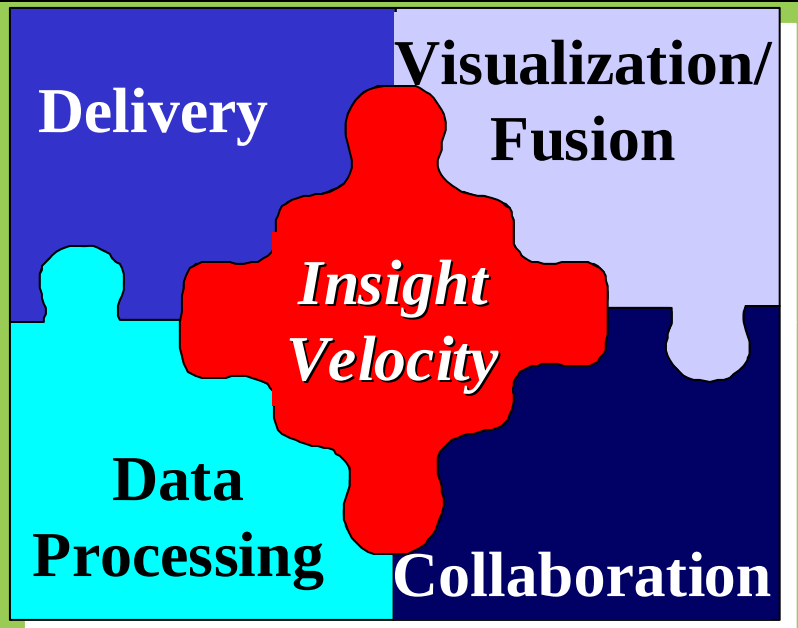
SAN DIEGO STATE UNIVERSITY

# Homeland Security Master's Program
# DHS S&T Conference, Jan. 14, 2008

SAN DIEGO STATE UNIVERSITY
Viz Center
Center for Information Technology and Infrastructure,
Homeland Security Master's Program,
Center for Homeland Security Technology Assessment
SDSU
SAN DIEGO STATE UNIVERSITY
Bob Welty
http://citi.sdsu.edu
Eric Frost

# Insight Velocity---Linking Policy and Technology for Homeland Security

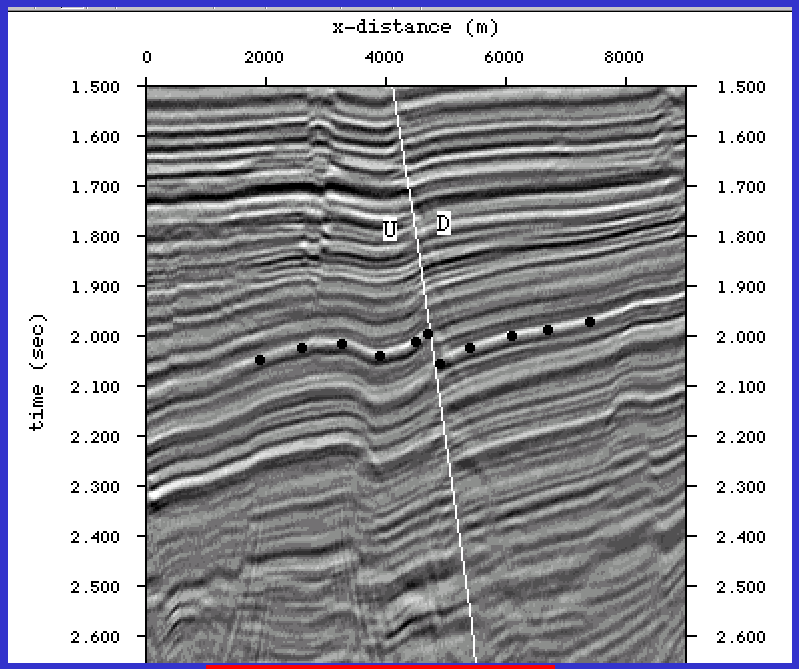
The Gating Factor to Improved Operational Efficiency and Financial Performance is ***the Rate at which Information is Consumed and Transformed into Knowledge and Action = Expert Bandwidth!***

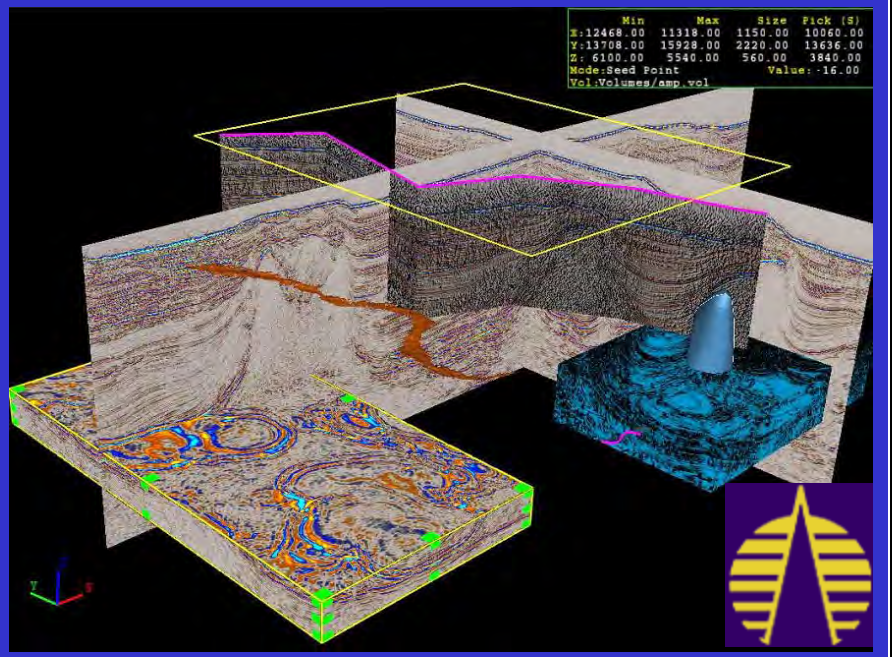



***Scenario***

| | |
|---|---|
| √ Capital | *Plenty* |
| √ Opportunities | *Plentiful but Immature* |
| √ People | *Bandwidth* ***Limited*** |

# Delivering Data and Voice and Location Globally, Tools and Insight to Help Empower Homeland Security



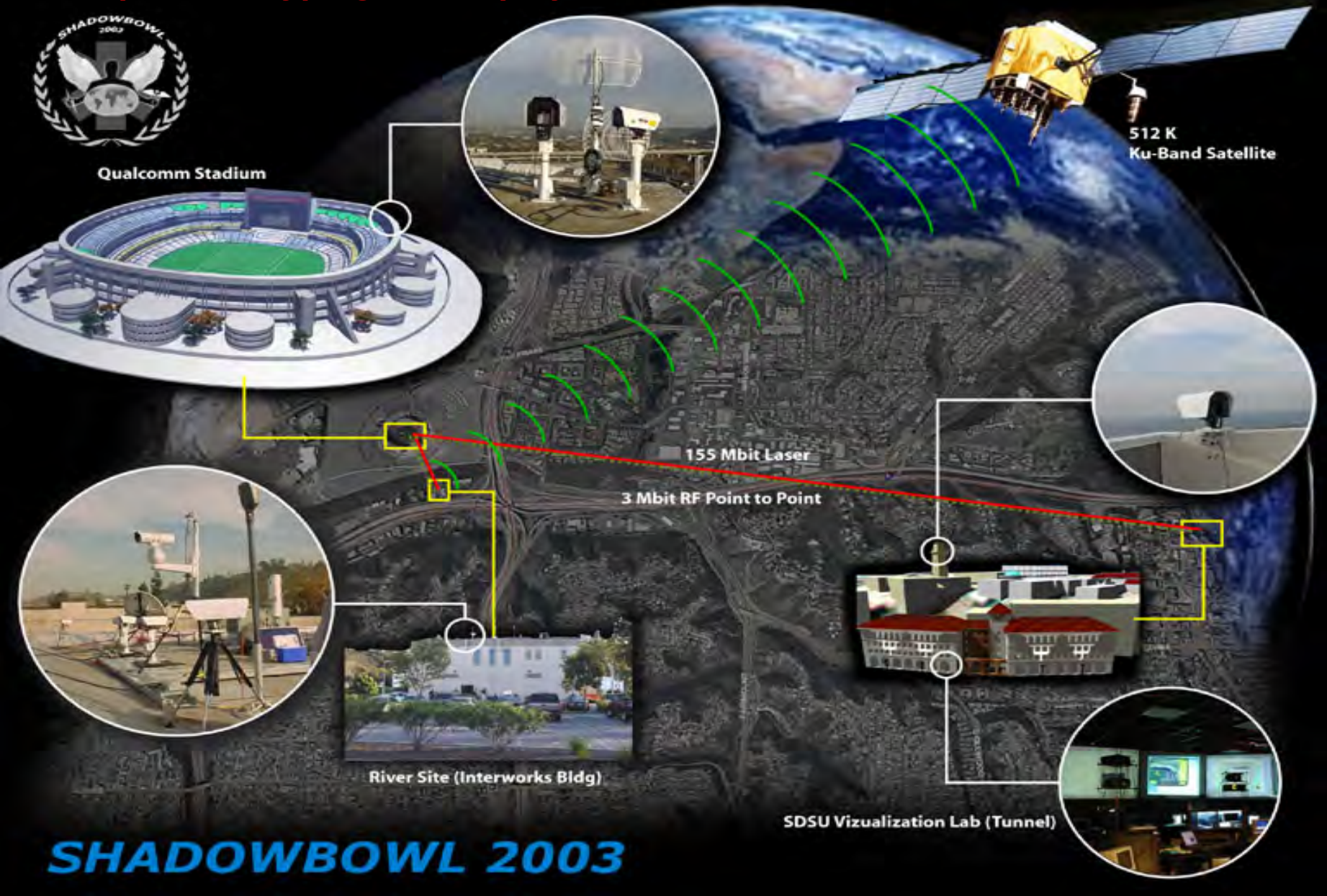

**1993**
100- MB
10% viewed
2-3 maps
12 months
***800KB/month***

***400,000 fold productivity improvement***

**2004**
400+ GB
100% viewed
Volumes
1 month
***400GB/month***

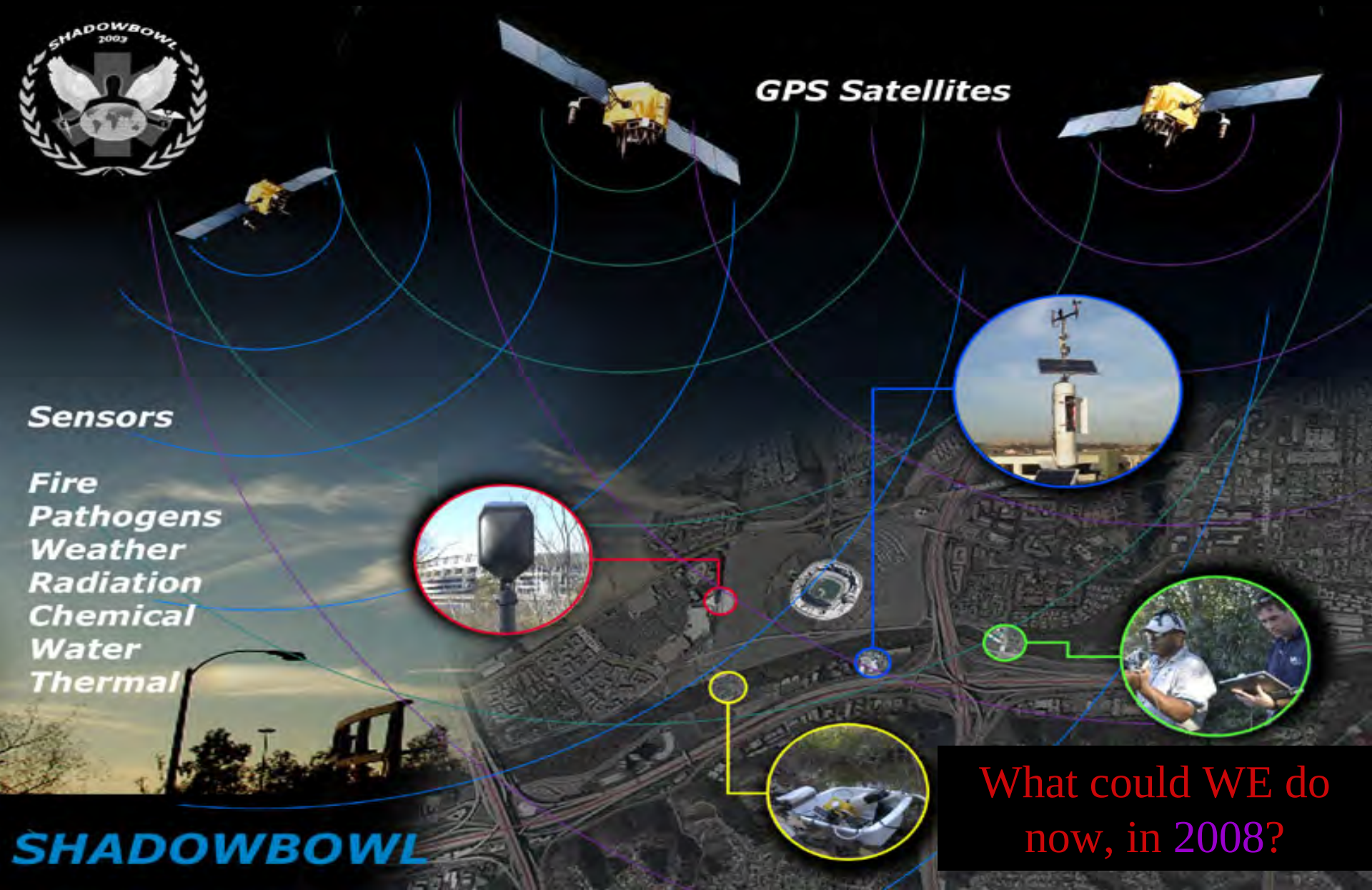
# Ex: ShadowBowl Communication Networks

## Rapid Prototyping and Deployment for Cameras, Sensors, and Data Fusion



# SDSU Viz Center in ShadowBowl

http://www.shadowbowl.sdsu.edu




What could WE do now, in 2008?

# Homeland Security Master's Program

Two Co-Directors, Eric Frost and Jeff McIllwain for academic program tied to Homeland Security research effort, Co-Directed by Eric Frost and Bob Welty.

Started in 2004 as Interdisciplinary Studies: Homeland Security major, blossomed into fully standalone program, entitled simply "Homeland Security Master's Program"

36 units, 4 core classes, strongly interdisciplinary, primary motivation for students is Public Service

# Homeland Security Master's Program

Students from FBI, TSA, Federal Air Marshal, Fire, Law Enforcement, Public Health, Border Patrol, Navy, Army, Marine Corps, industry, NGOs, humanitarian focus

**Leverages Location of Phone, Satellite System, Geospatial Datasets, Imagery, and Camera or Sensors Connected to Phone**

# Mash-up Example: Missing People (icon on image)

## Using GeoFusion Imagery as Underlayer for any SQL Database

Disconnectedness defines danger.

Dr. Tom Barnett, The Pentagon's New Map, 2004

Comms first.

Dr. Sheryl Brown, CIO, United States Institute of Peace

*http://www.strongangel3.net*

# SDSU Visualization Center

## Example of Data Fusion for Making Decisions

Sensor Networks, Wireless / Optical Communications, Remote Sensing, Imaging, Data Fusion, Data Visualization, and Decision Support

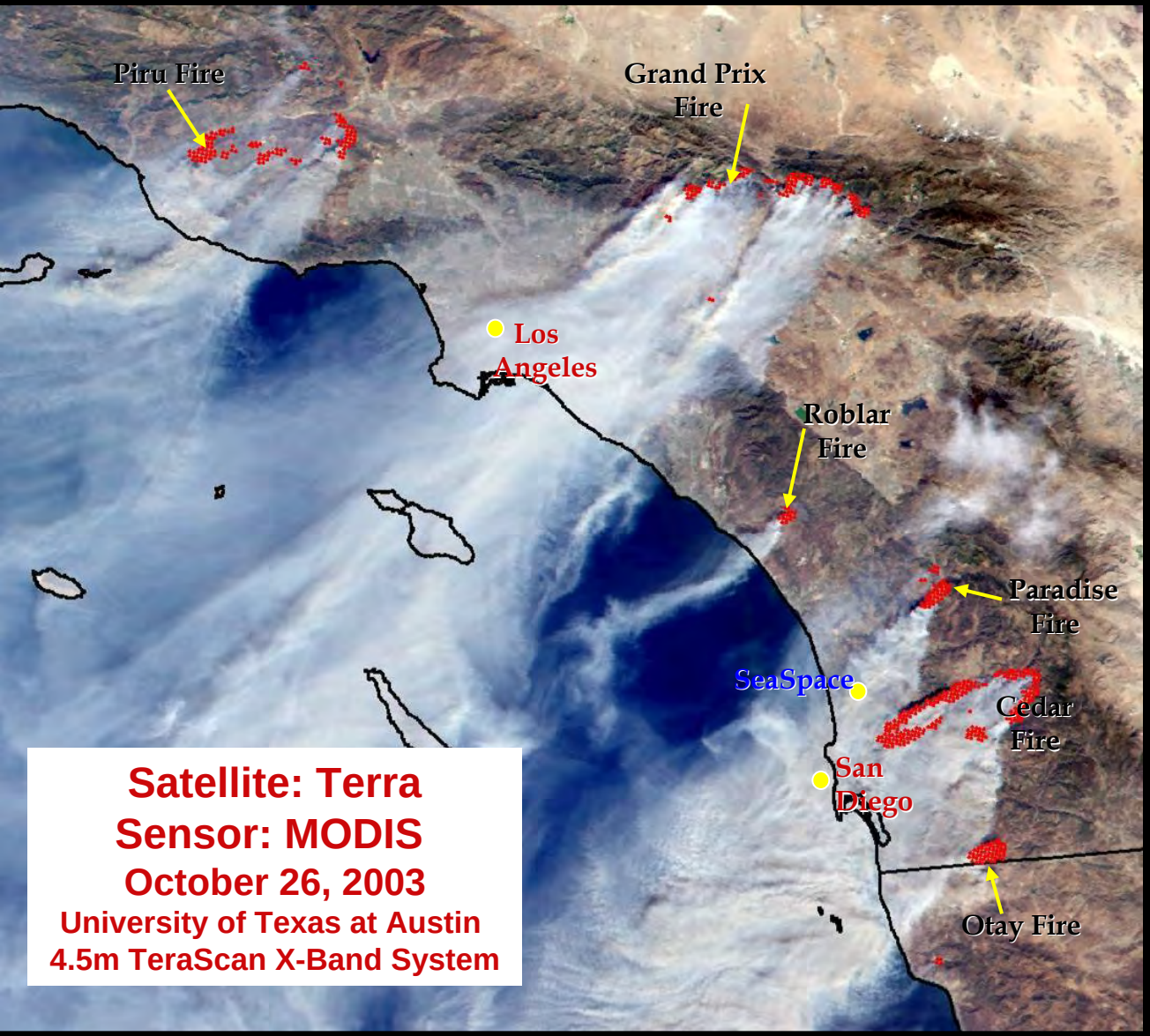
Viewing Airplanes, Boats, Cars, and Trucks all Together
3D Stereoscopic Images (two images---let brain do the work)

Very few such applications exist---
but leveraging gift of brain and how we see, understand, and make decisions that can assist in HADR

With technology of two images, taken either from simple phone, or phone with stereo-camera, or two phones each sending image.

Can produce high-quality virtual worlds

# MODIS imagery for Tactical Fire Response




## Vulcan Example:

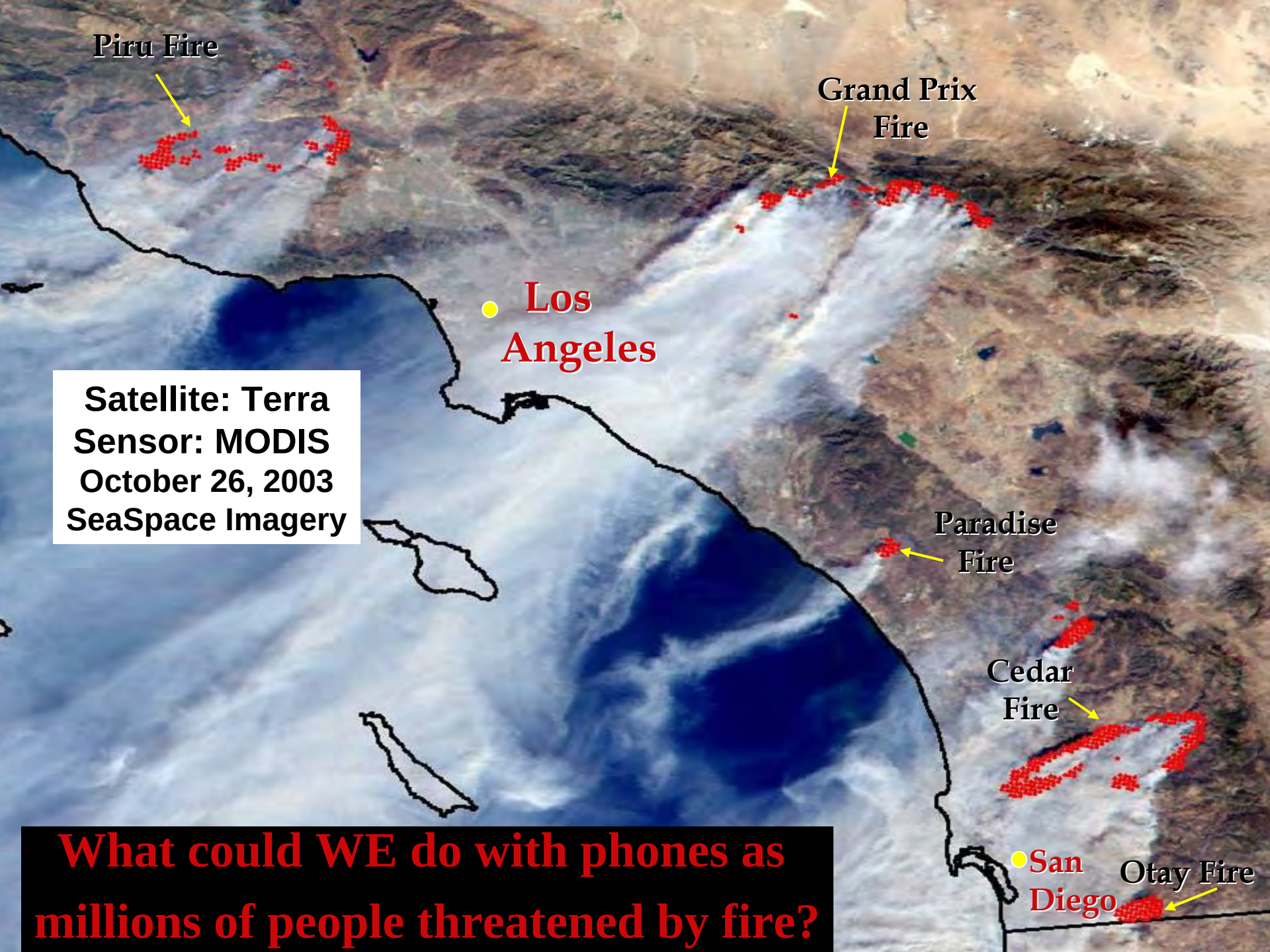
## The Devastating Southern California Fires of October 2003

- Over 660,000 acres burned

- Over 2500 homes burned

- 24 Deaths

## What can WE do For Rapid Fire Response?


Piru Fire
Grand Prix Fire
Los Angeles
Satellite: Terra
Sensor: MODIS
October 26, 2003
SeaSpace Imagery
Paradise Fire
Cedar Fire
San Diego
Otay Fire
What could WE do with phones as millions of people threatened by fire?

# ALLHAZ Field level Emergency Operations Concept

*Elizabeth Matlack*

*Jackson State University*

*Ed Collins*

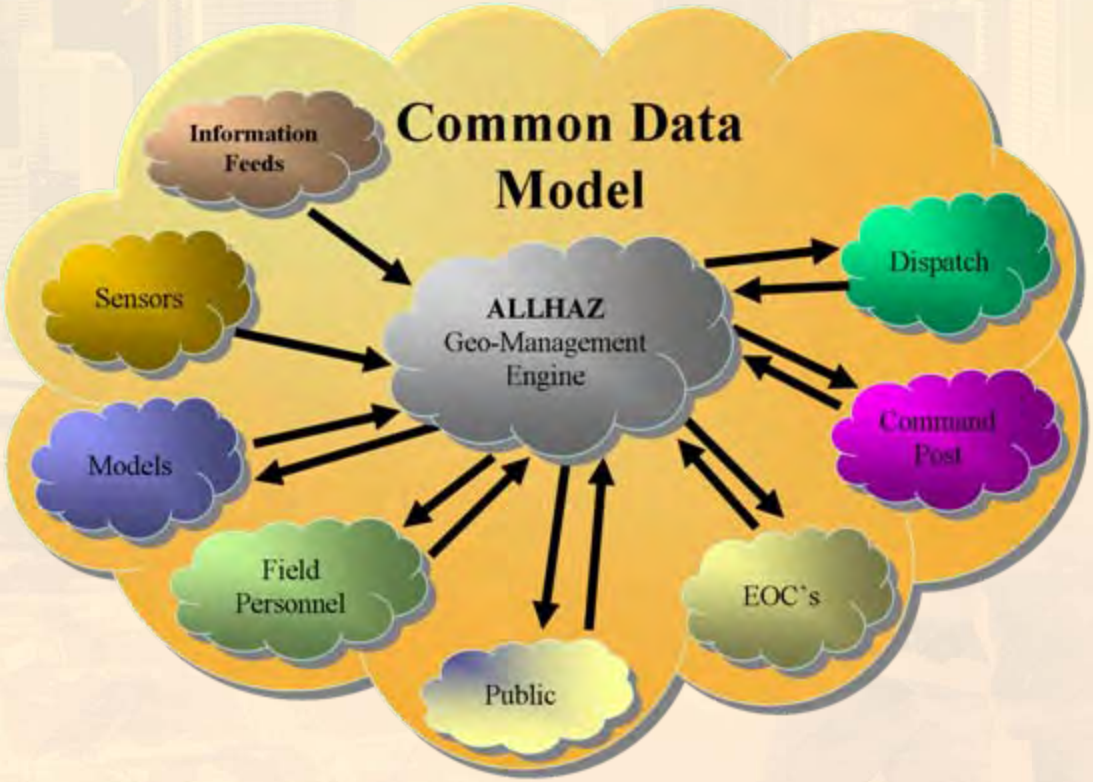
*Jackson State University*

*Dave Kehrlein*

*ESRI Professional Services*

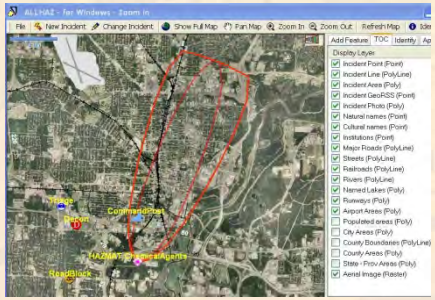
# Overview

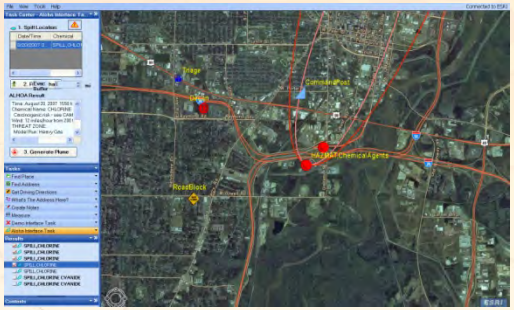
- What is ALLHAZ?
- How did we get here?
- Inputs
- Users
- Pulling it all together
- A vision for the future

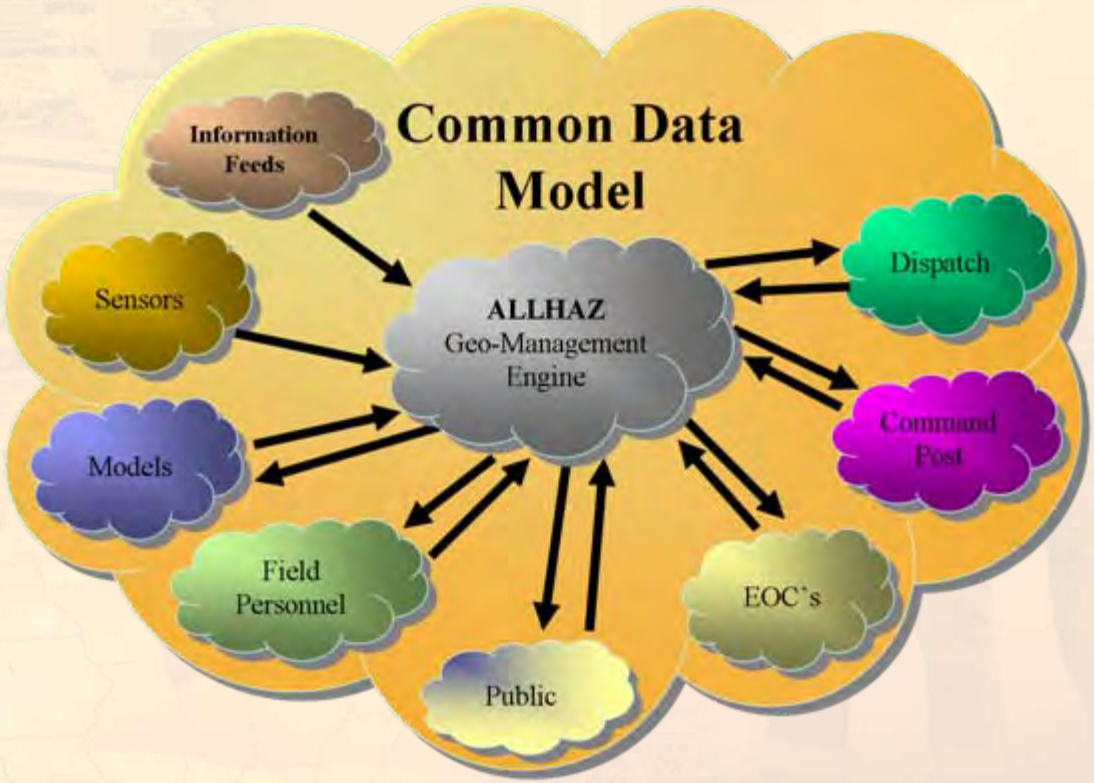


# What is ALLHAZ?

**ALLHAZ provides all field operations personnel with a standardized, scalable, geospatially enabled tool that they can use to assist in planning for, mitigating, responding to and recovering from All Hazards of all sizes**

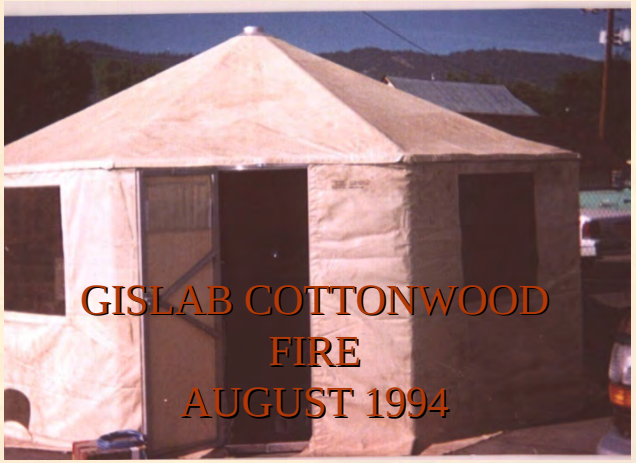






# How did we get here?

- Traditional GIS systems target technical end users.
  - Complicated to use
  - Inconsistent format
  - Diverse, disconnected data.
- Different solutions for each type of event
  - User interface
  - No standard Data Model
  - No standard data sharing environments
- Lack of Scalability
  - Systems break when the event gets too big



# Landscape Assessment

**Historical approach**

- **Different system for different disasters**
- **Systems designed to be run by technician**
- **Different data bases – little or no sharing**
- **Limited mobile capabilities**
- **Limited scalability**
- **Limited data sharing across jurisdictions (Local ↔ State ↔ Regional ↔ Federal)**

# Landscape Assessment

**ALLHAZ provides:**

- **Single user interface for all hazards**
- **Scalable to grow with event**
- **Handheld, Tablet, Desktop, Server, Internet**
- **DHS National Data Model (Fusion Centers & Project Homeland)**
- **Shareable data at all jurisdiction levels**
- **NIMS forms integration**
- **NRP ESF compliant reporting**

# ALLHAZ Scenarios

- HAZMAT Spill – demo
- Logistics resource Management
  - Check in/ Dispatch trucks
  - Log load & distination
  - Near real time advisory to receiving point
  - Reporting
- Shelter Management
  - Resources management /requests / receipt
  - Arrivals / Departures of evacuees
  - Beds & services available

# ALLHAZ Scenarios

- Fire Mitigation & Planning
  - Property assessment / inspections
  - Mitigation plan monitoring
  - CCC / FS /DOW / Board of Realtors / Schools / Ski Corp / Banks / Investors
- Boarder Patrol
  - Situational Awareness
  - Sightings / trails / tunnels / signs of crossings
- USAR
  - Locate survivors & victums
  - Track search areas and coverage

# ALLHAZ Scenarios

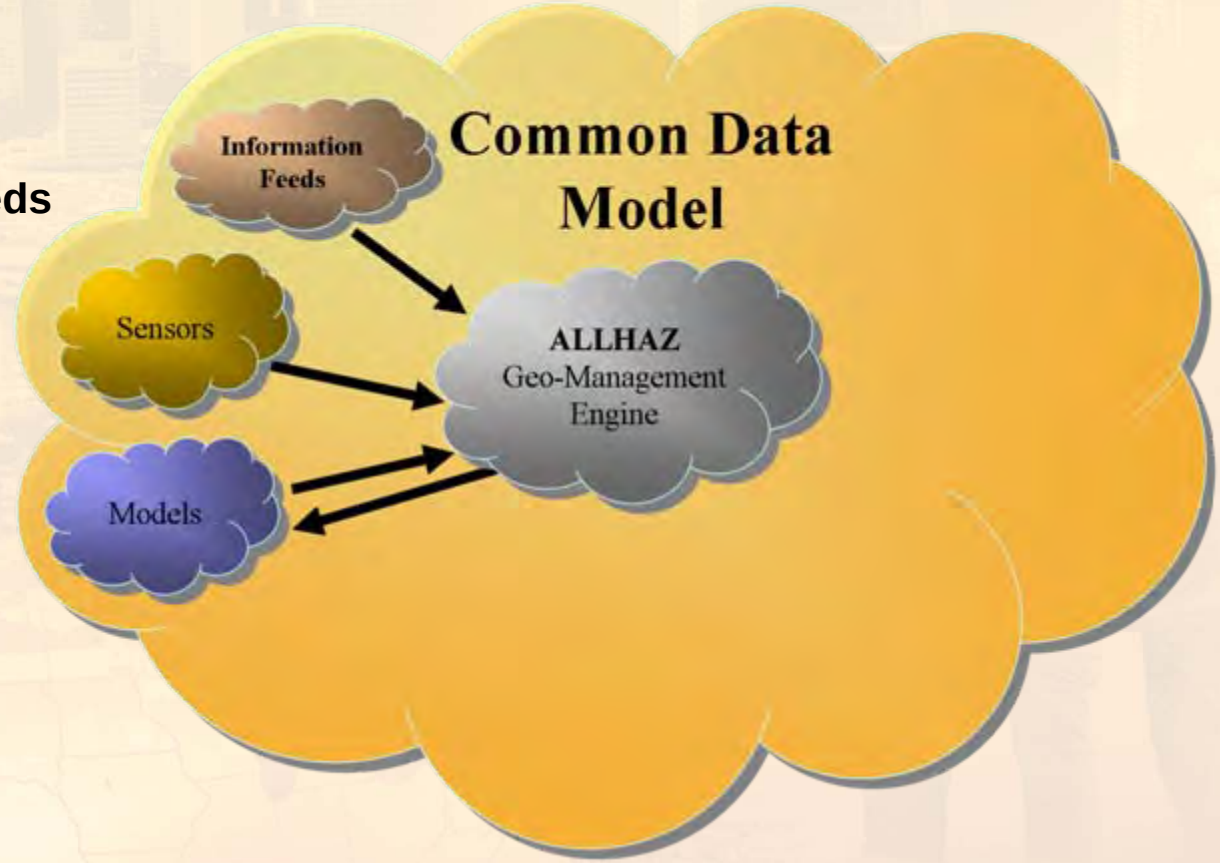
- Disease outbreak (Avian Flu)
  - Locations / quarantine zones
  - Evacuation area / routes
  - Hospital / triage locations / decon
- Dam Break & Flooding
  - Locations / impact areas (models)
  - Evacuation area / routes / shelter locations / shelter availability (animal & human)
- Damage Assesment (general)
  - Location / type / immediate needs/ repetitive loss
  - Evacuation area / routes / shelter locations, etc.

# ALLHAZ Scenarios

- Hurricane / Tornado / Earth Quake
  - Evacuation area / routes
  - Resource logistics
  - Shelter locations (Animal and Human)
  - Damage assessment
  - Search and Rescue

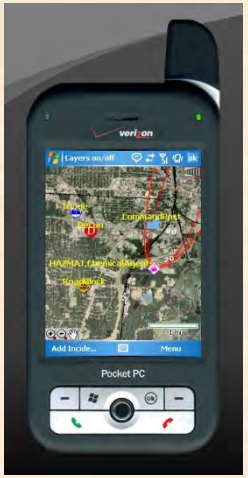
# Inputs

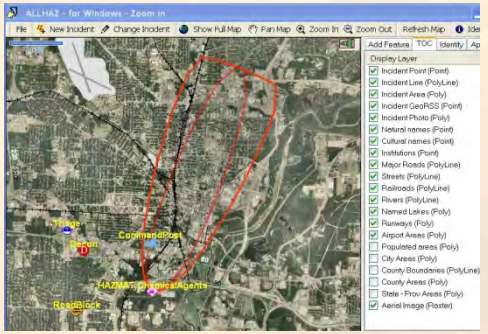
- **Common Ground**
  - User Interface
  - Data models
  - Common Symbology
- **Sensors , Information Feeds**
  - Weather
  - Flood
  - Chemical
- **Models**
  - Plume
  - Buffer
  - Hydro
  - Fire



# Common Ground

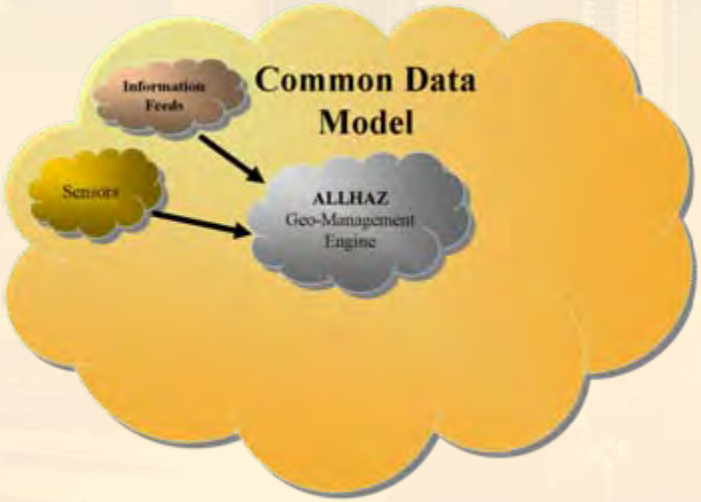
- **Common Ground**
  - **User Interface**
  - **Data models**
  - **Common Symbology**



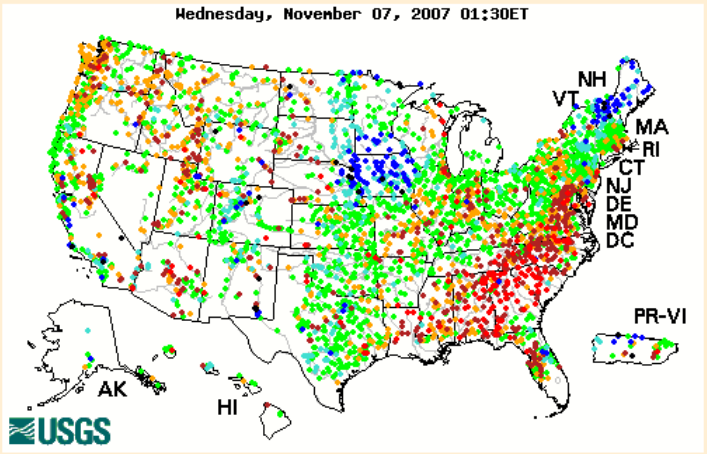



# Information Feeds and Sensors

- **Sensors , Information Feeds**
  - **Weather**
  - **Flood**
  - **Chemical**

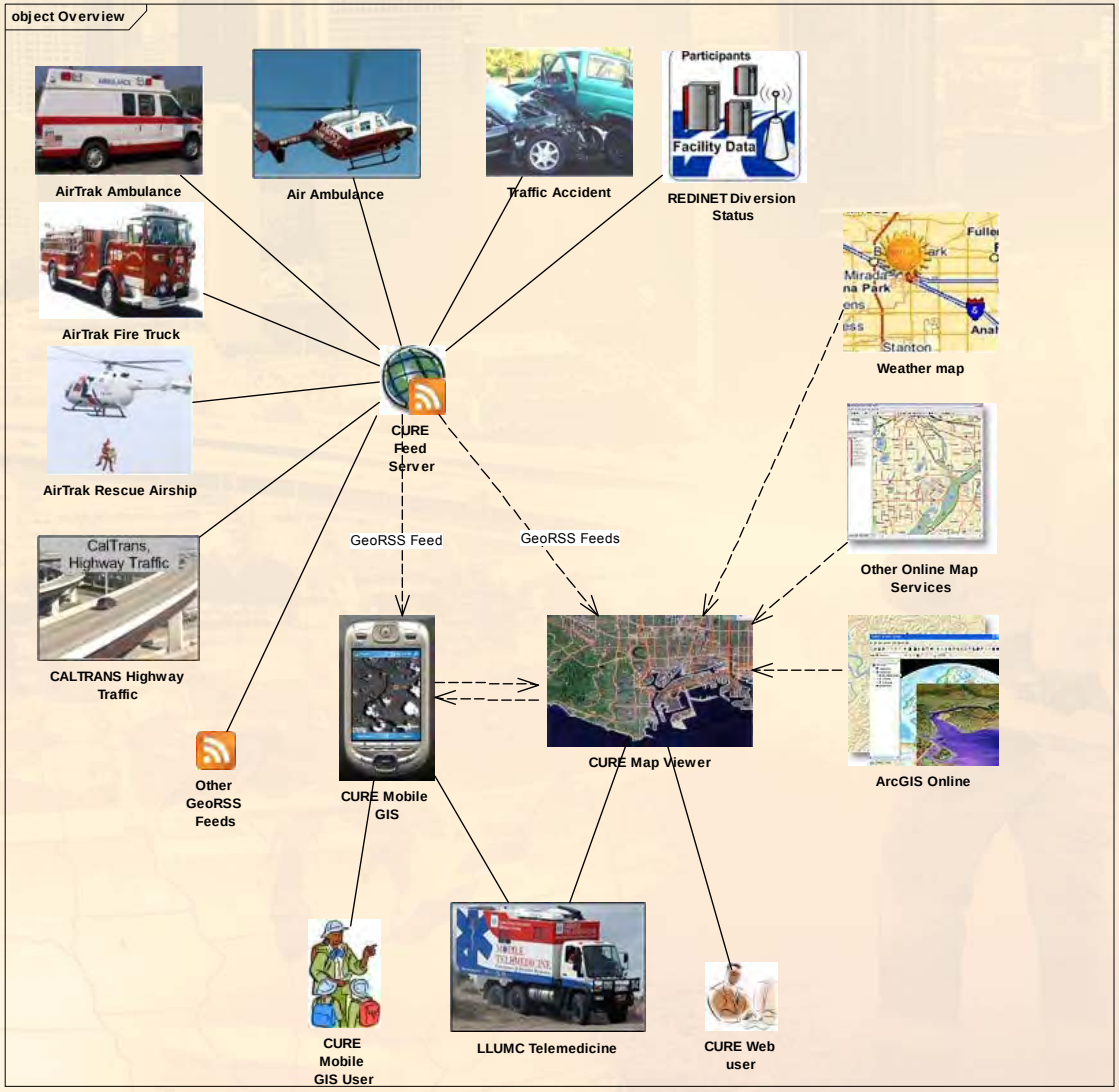


**Daily Streamflow Conditions**



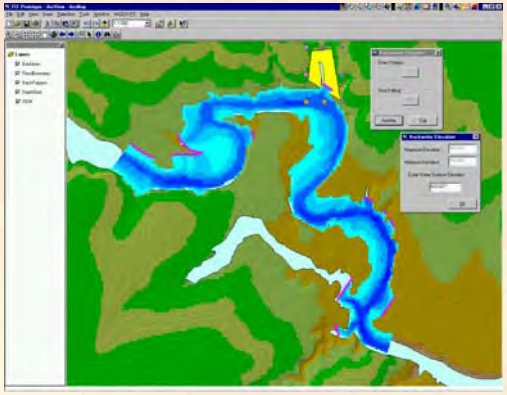
# Information Feeds and Sensors

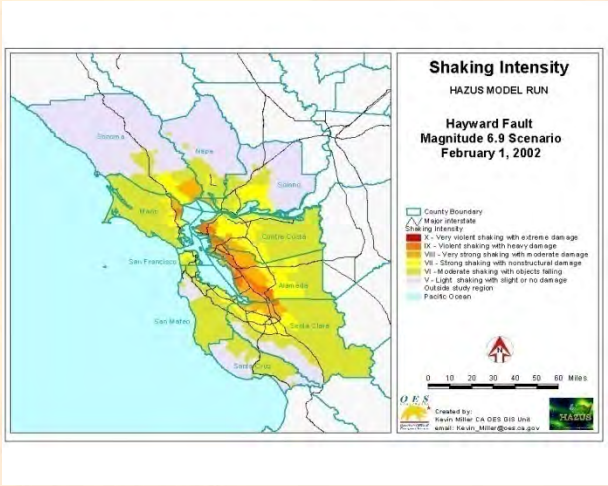
## GEORSS Feeds



# Models

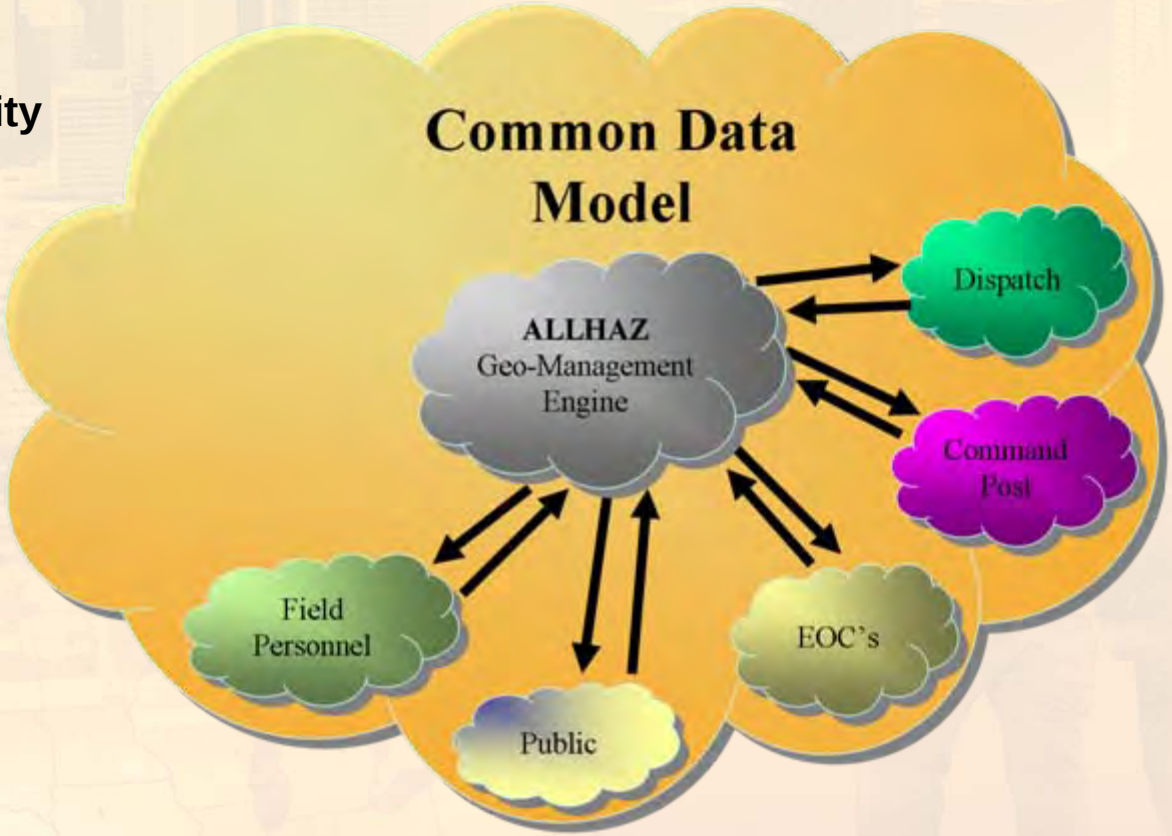
- Models
  - Plume
  - Buffer
  - Hydro
  - Fire





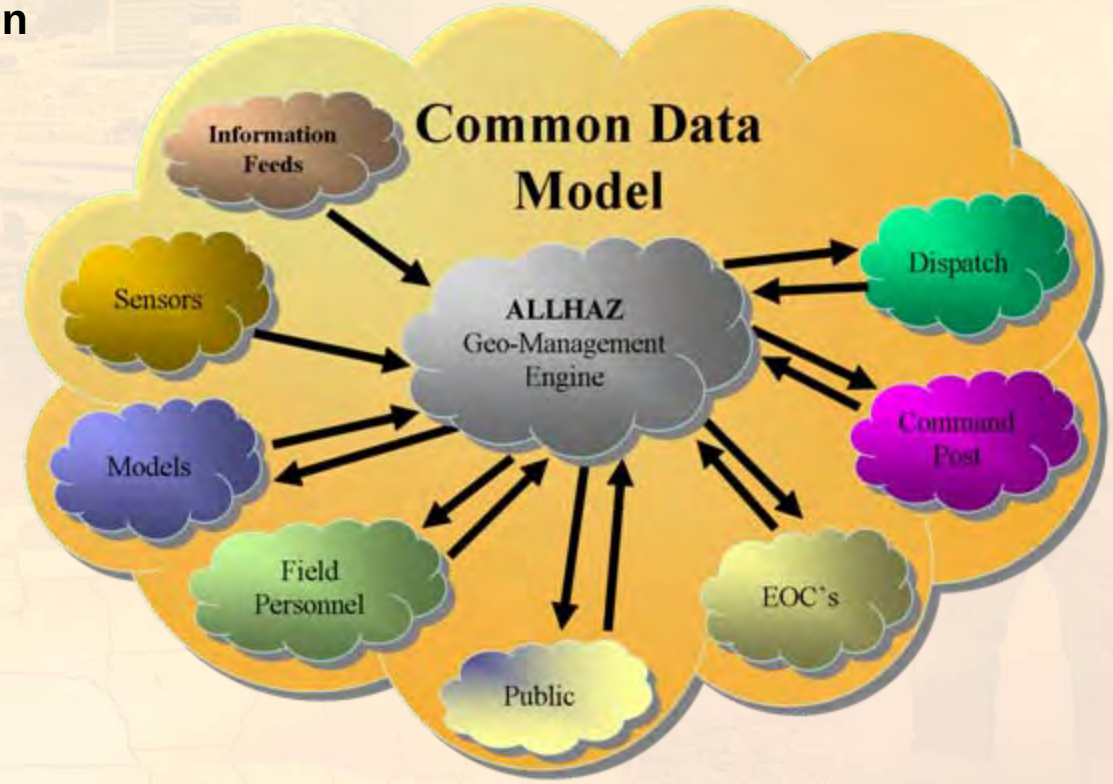
# User Communities

- Primary user community
  - Command Post
  - Field Operations
- Secondary user community
  - Dispatch
  - EOC
    - Local
    - State
    - Federal
  - JFO
- Public
  - Warning
  - Evacuation
  - Sheltering

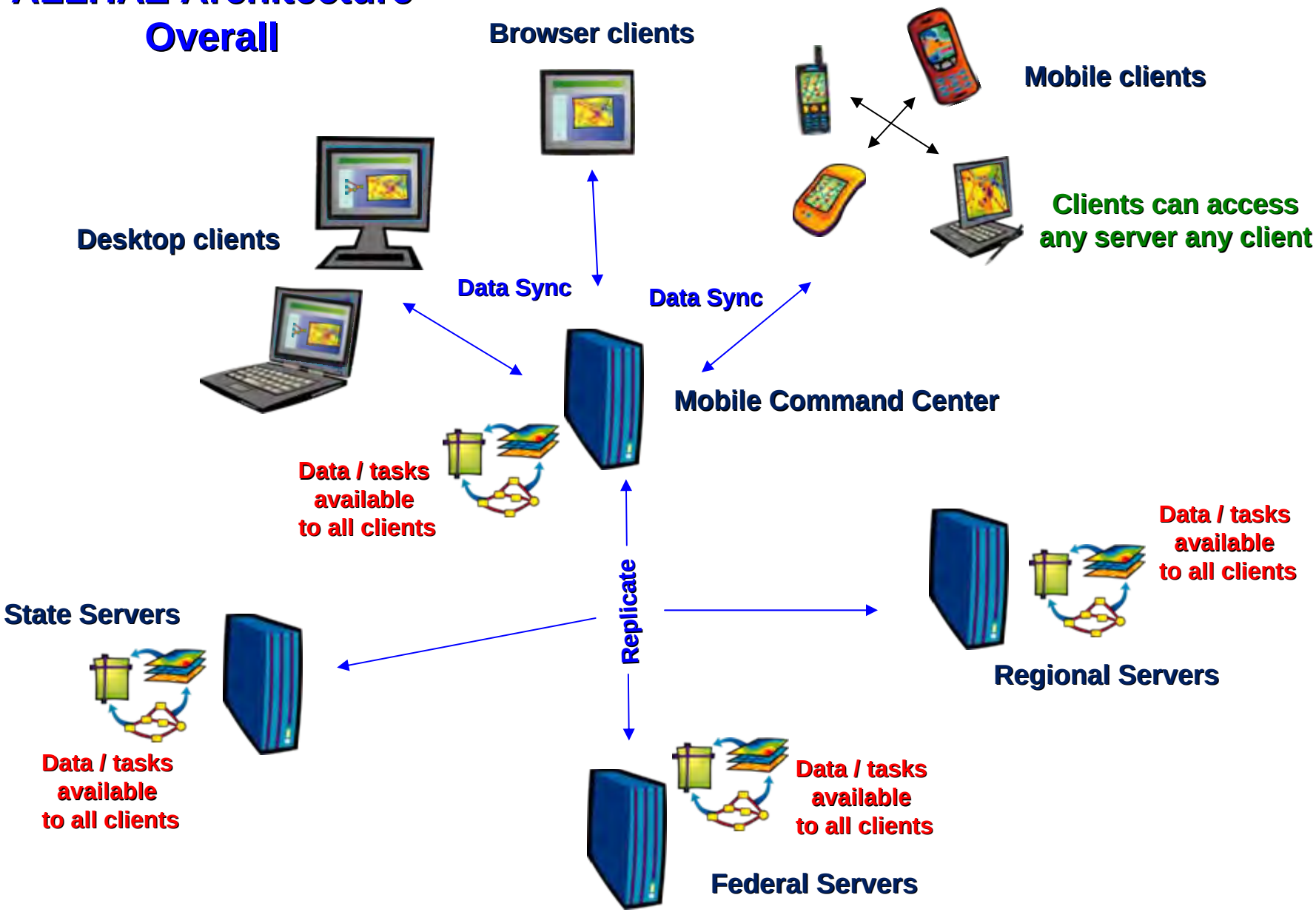


# Pulling it all together

- All Hazards can play in the same application
- Information flows between all user communities
- Fosters coordination and collaboration
  - Real time information
  - Multi-agency
  - Multi-incident
- Sharing
  - Data
  - Models
  - Responsibility
  - Resources



# ALLHAZ Architecture Overall



# ALLHAZ
# HAZMAT Scenario

Xplore Tablet with wireless Service in Field

Road Blocks Set

Spill location entered

Spill location distributed

Plume distributed to all clients

Demographic report of plume area generated

Laptop with wireless service in EOC

Command Center, Triage, Decon Set

Command Center, Triage, Decon Distributed

Servers in California

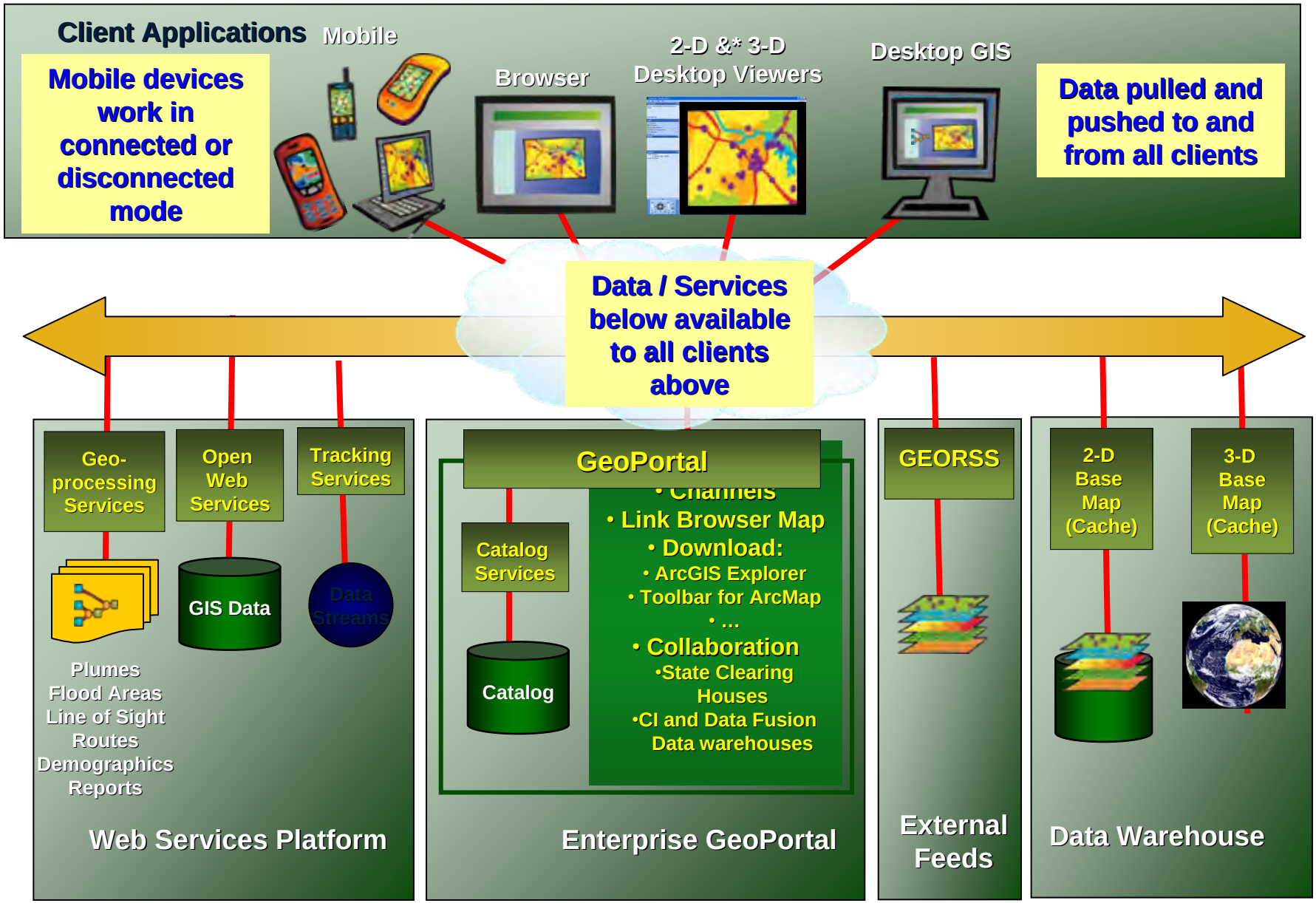
Road Blocks Distributed

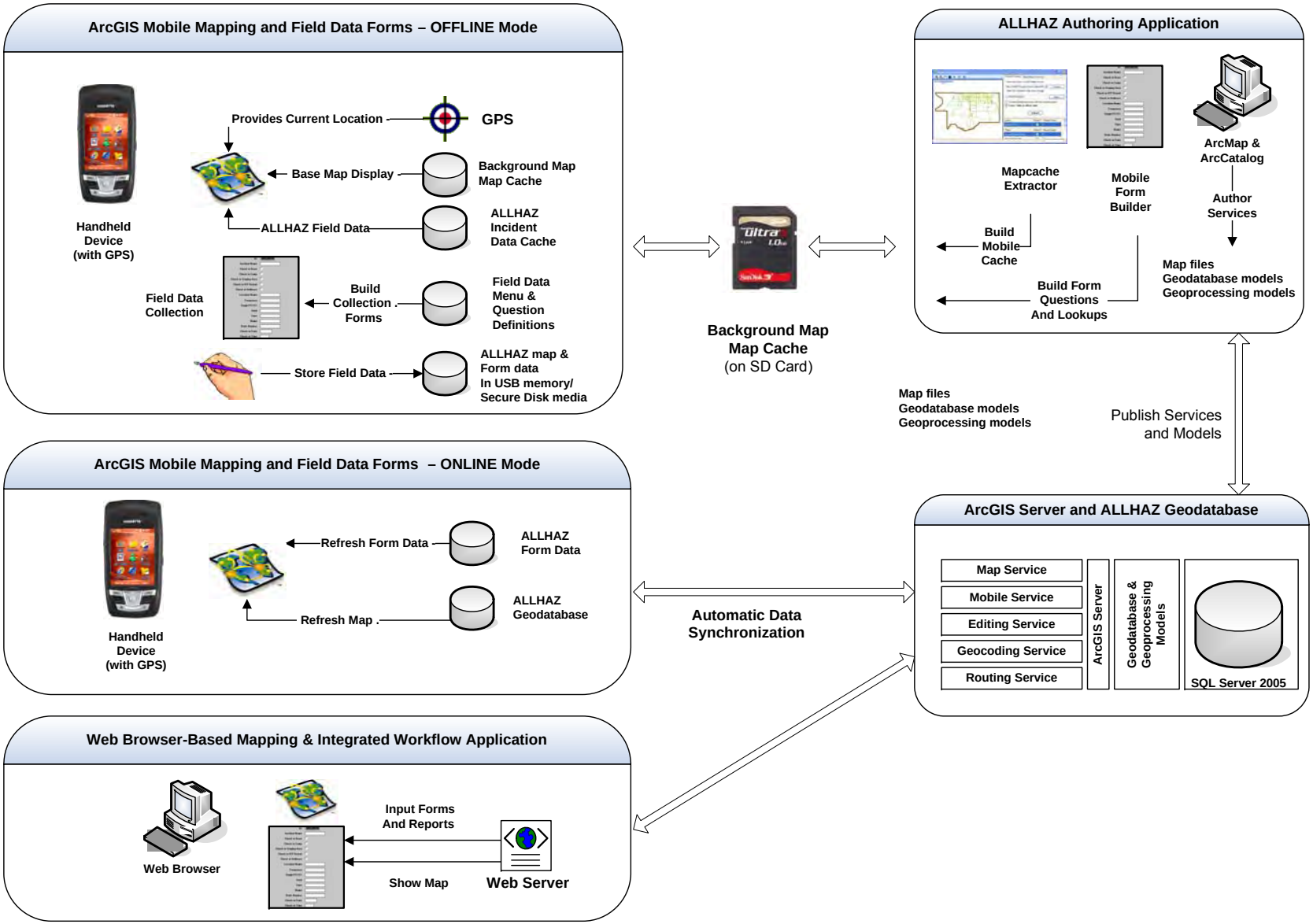
Mobile Phone with Verizon Service in Field

Road Blocks Set

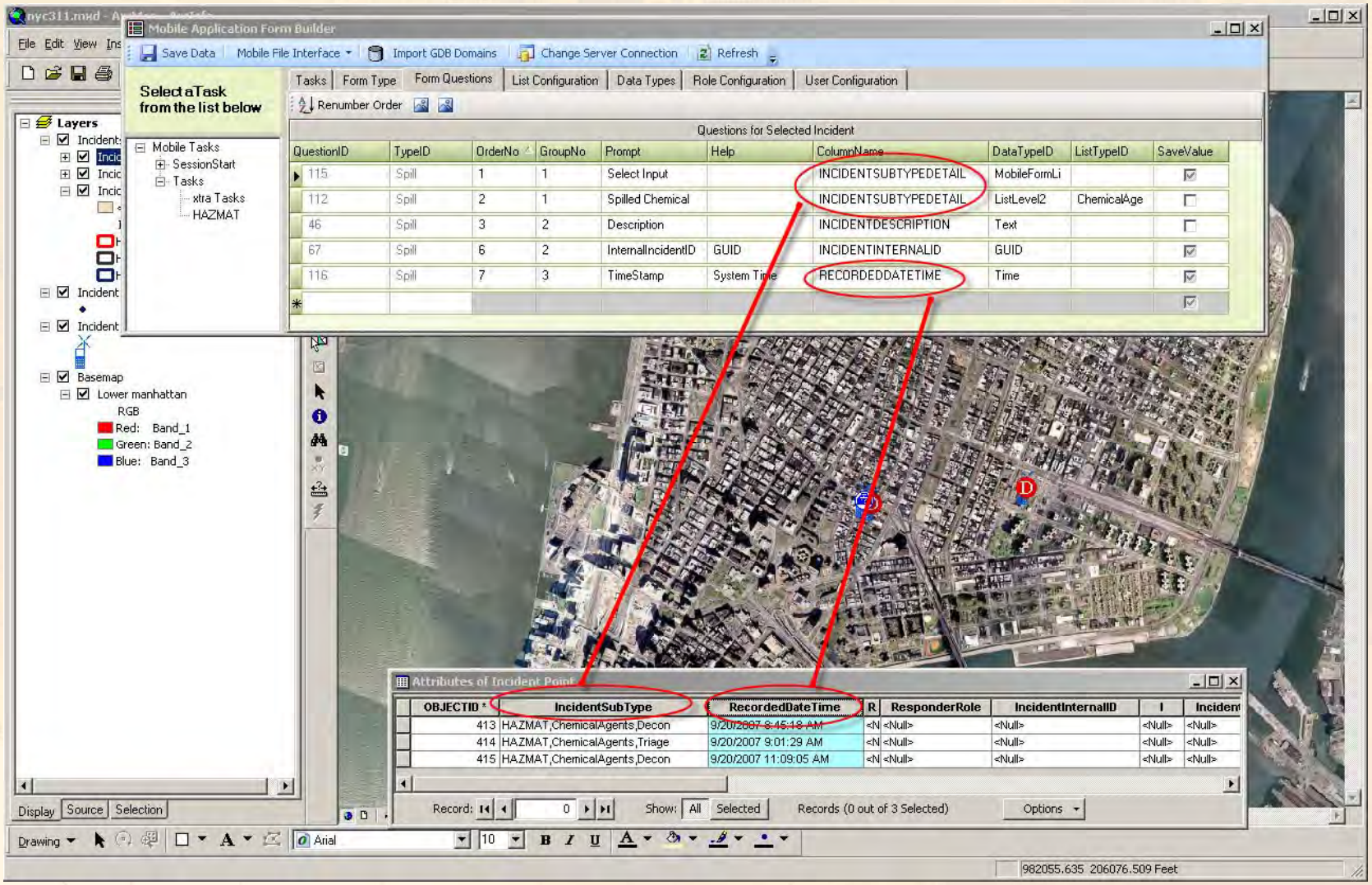
Mobile Phone with Cingular Service in Field

# ALLHAZ Architecture




ArcGIS Mobile Mapping and Field Data Forms – OFFLINE Mode
Handheld Device (with GPS)
Provides Current Location
GPS
Base Map Display
Background Map Map Cache
ALLHAZ Field Data
ALLHAZ Incident Data Cache
Field Data Collection
Build Collection Forms
Field Data Menu & Question Definitions
Store Field Data
ALLHAZ map & Form data In USB memory/ Secure Disk media
Background Map Map Cache (on SD Card)
ALLHAZ Authoring Application
Mapcache Extractor
Mobile Form Builder
ArcMap & ArcCatalog
Author Services
Build Mobile Cache
Build Form Questions And Lookups
Map files Geodatabase models Geoprocessing models
Map files Geodatabase models Geoprocessing models
Publish Services and Models
ArcGIS Mobile Mapping and Field Data Forms – ONLINE Mode
Handheld Device (with GPS)
Refresh Form Data
ALLHAZ Form Data
Refresh Map
ALLHAZ Geodatabase
Automatic Data Synchronization
ArcGIS Server and ALLHAZ Geodatabase
Map Service
Mobile Service
Editing Service
Geocoding Service
Routing Service
ArcGIS Server
Geodatabase & Geoprocessing Models
SQL Server 2005
Web Browser-Based Mapping & Integrated Workflow Application
Web Browser
Input Forms And Reports
Show Map
Web Server

# Formbuilder



# Servers

- Perform hazard specific analysis, data management, data access
- Replicate data between servers
- Data streamed via webservice (or cached locally on mobile client)

# Mobile clients

- Support for Windows Mobile 5, CE 2.0, Mobile for Pocket PC 2003, 2003 CE and XP operating systems (smart phones, tablets, laptops)
- "Sometimes Connected" environment
  - map data stored locally
  - continous data collection and use
  - Bi-directional data flow when connected or synced
- Initiate geoprocessing tasks from field and receive results

# Desktop Clients

- **Viewers including browser based and free 2D and 3D desktop applications.**
- **Viewers customized with hazard-specific tasks and functions.**

- **Existing COTS professional GIS applications access data via webservice**

# A Vision for the future

- **The Public is our greatest and least utilized asset**
- **Follow the technology. Where is it going?**
- **All disasters are local. Lead from the bottom not the top. (Local vs. Federal guidance and direction setting)**

Department of Homeland Security

# Office of Small and Disadvantaged Business Utilization (OSDBU)

**Phyllis Miriashtiani**

**Desk Officer,**
**DHS/OSDBU**

Homeland Security

# Department of Homeland Security Mission

**“We will lead the unified national effort to secure America. We will prevent and deter terrorist attacks and protect against and respond to threats and hazards to the nation. We will ensure safe and secure borders, welcome lawful immigrants and visitors, and promote the free-flow of commerce.”**

# DHS Acquisition Regulation Small Business Policy

- "DHS is committed to a unified team approach involving senior management, small business specialists, acquisition personnel and program staff to support both critical homeland security missions and meet public policy objectives concerning small business participation on departmental procurements."

# Three Major Types of Business Opportunities at DHS

- ★ Contracts and Subcontracts
- ★ Research and Development
- ★ Grants to State and Local Governments

# 8 Major DHS Buying Activities

- ★ Customs & Border Protection
- ★ DHS Headquarters Office of Procurement Operations
- ★ Federal Emergency Management Agency
- ★ Federal Law Enforcement Training Center
- ★ Immigration & Customs Enforcement
- ★ Transportation Security Administration
- ★ U.S Coast Guard
- ★ U.S. Secret Service

# Customs and Border Protection (CBP)

- ★ Protects America's borders against terrorists and other criminals, while facilitating trade and travel.
- ★ Oversees 2,000 miles of border with Mexico, 5,000 miles of border with Canada, 317 "ports of entry" (official crossing points) and 136 Border Patrol stations with 33 interior checkpoints.

# HQ Office of Procurement Operations

**Provides a full range of acquisition support to 35 program offices within Homeland Security such as:**

**Science & Technology**

**Citizenship & Immigration Services**

**US-Visit**

**Center for Domestic Preparedness**

**CFO**

**CIO**

# HQ Office of Procurement Operations

**Provides a full range of acquisition support to 35 program offices within DHS such as:**

- ★ **Office of the Secretary (USM, CPO, CIO, CFO)**
- ★ **US VISIT Program Office**
- ★ **Office of Preparedness**
- ★ **Office of Intelligence & Analysis**
- ★ **Domestic Nuclear Detection Office**
- ★ **Science & Technology (HSARPA)**
- ★ **Citizenship & Immigration Services**
- ★ **Center for Domestic Preparedness**

# Federal Emergency Management Agency (FEMA)

- ★ Manages Federal response and recovery efforts following any national disaster
- ★ Provides disaster assistance in the form of housing and financial assistance caused by disaster
- ★ Manages the National Flood Insurance Program
- ★ Coordinates 4,000 standby disaster assistance employees available for deployment after disasters

# FEMA
# Readiness Contracts

- Contracts/Agreements in place for emergencies
- Include all types of supplies/services required for emergencies (tarps, pharmaceuticals, comms equipment, mobile power, vehicles, fuel, water, etc.)
- Contact the FEMA Acquisition Business Office (www.fema.gov/ or (202) 646-4006)

# Federal Law Enforcement Training Center (FLETC)

- ★ Provides training that enables federal, state and local law enforcement partners to accomplish their missions (training is provided by in-house trainers)
- ★ Provides mission-responsive infrastructure

# Immigration and Customs Enforcement (ICE)

- ★ Investigates issues such as human smuggling, export enforcement, contraband smuggling, and financial and immigration crimes
- ★ Ensures the departure from the U.S. of all removable aliens
- ★ Collects and analyses intelligence data for use by ICE and DHS
- ★ Reduces threats posed against the more than 8,800 federal facilities nationwide (FPS)

# Transportation Security Administration

- ★ Protects the nation's transportation systems
- ★ Screens all airline passengers
- ★ Deploys Federal air marshals to detect, defeat, and deter hostile acts targeting <u>all</u> transportation modes
- ★ Screens 100% of 1 billion pieces of luggage checked annually
- ★ Detects and deters the use of explosive devices in transportation systems

# U.S. Coast Guard (USCG)

- ★ Protects ports, waterways, & flow of commerce from terrorism
- ★ Provides maritime border security against illegal drugs, illegal aliens, firearms and WMD
- ★ Provides protection of natural resources
- ★ Provides maritime safety, including search & rescue efforts, commercial and recreational boating safety

# U. S. Secret Service

- ★ Protects the President, Vice President, visiting heads of state, and other government leaders
- ★ Protects U.S. currency from counterfeiters and safeguards Americans from financial crimes
- ★ Plans, coordinates, and implements security for designated national special security events (NSSE)
- ★ Emphasizes prevention through protective intelligence and threat assessment

# Role of the OSDBU

- ★ The OSDBU serves as the focal point for small business acquisition matters, and works closely with all DHS organizations to implement the program.
- ★ The OSDBU strives to create an environment in which small businesses have a meaningful opportunity to obtain DHS prime and subcontracts.
- ★ OSDBU and small business procurement information: please visit www.dhs.gov/openforbusiness

# Role of the OSDBU

**Major Activities**

- ★ **FY 2008 Forecast of Contract Opportunities (includes a point of contact for each project)**
- ★ **Listing of DHS large business prime contractors with small business prime contracting opportunities**
- ★ **Links to DHS acquisition offices, small business specialists, and FedBizOpps**
- ★ **Outreach Programs**
- ★ **DHS Mentor-Protégé Program**

# Small Business Considerations

- ★ 8(a)
- ★ HUBZone
- ★ Service Disabled Veteran Owned Small Business
- ★ Traditional Small Business Set-Asides
- ★ Small Business Teams or Joint Ventures
- ★ Full and Open Competition – Subcontracting and DHS Mentor-Protégé Program

# DHS Mentor-Protégé Program

- ★ Mentor-protégé program features three incentives: pre-award, post-award, and annual recognition
- ★ Mentor-Protégé Program is open to all small businesses
- ★ Details and application format available on the DHS small business website

# Small Business Goals for FY 2008 / 2009

- SB prime - 30.0%
- 8(a) – 4.0%
- SDB [non-8(a)] prime – 4.0%

(note: 8(a) + SDB [non-8(a)] = 8.0%

- WOSB prime – 5.0%
- HUBZone prime – 3.0%
- SDVOSB prime – 3.0%
- SB sub – 40.0%
- SDB sub – 5.0%
- WOSB sub – 5.0%
- HUBZone sub – 3.0%
- SDVOSB sub– 3.0%

# FY 2007
# Preliminary Small Business Prime Contracting Accomplishments

| Category | Goal (%) | Accomplishment ($) | Accomplishment (%) |
|---|---|---|---|
| Total Procurement Dollars | N/A | $9,119,215,901 | N/A |
| SB Prime Contracts | 30.0% | $3,046,078,360 | 33.40% |
| 8(a) Contracts | 4.0% | $477,848,188 | 5.24% |
| SDB Prime Contracts | 4.0% | $668,962,919 | 7.34% |
| Overall SDB [8(a) + SDB Prime] | 8.0% | $1,146,811,107 | 12.58% |
| WOSB Prime Contracts | 5.0% | $687,846,560 | 7.54% |
| HUBZone Prime Contracts | 3.0% | $238,915,293 | 2.62% |
| SDVOSB Prime Contracts | 3.0% | $132,183,682 | 1.45% |

# Strategic Positioning

- Marketing tips from small businesses that have been successful in the federal marketplace:
  - Review all background information
  - Understand difference between use of pre-existing contract vehicles and open market buying – and position your firm accordingly
  - Participate in small business outreach/networking activities
  - Teaming

# Helpful Hints

- ★ Register in CCR – make sure your profile is current and complete; especially the Performance History section (www.ccr.gov)
- ★ Receive electronic notifications from FedBizOpps (www.fbo.gov)
- ★ Looking for subcontracting opportunities – go to SBA's SubNet listing (http://web.sba.gov/subnet)
- ★ Look to local resources – SBA, PTACs, local Federal agencies (use the "blue" pages in the phone book to find them)

# Other DHS Programs

- ★ Research and Development Opportunities (featuring Broad Agency Announcements from the DHS Science and Technology Division)
- ★ Small Business Innovation Research (SBIR) Program
- ★ DHS Grants to State and Local Governments (potentially resulting in a state or local government procurement opportunity)
- ★ For more information on DHS programs of interest to the business community, please visit www.dhs.gov/openforbusiness

Homeland
Security

# An Introduction to Specific Tools for Communications Interoperability Improvement

Luke Klein-Berndt and Michael Skena
Office for Interoperability and Compatibility
Command, Control and Interoperability
Science and Technology Directorate
Department of Homeland Security

*"Putting First Responders First"*

Homeland Security
Science & Technology

# Agenda

1. Introduction to the Office for Interoperability and Compatibility (OIC)
2. The Interoperability Challenge
3. Specific Tools:
   - *Improving Interoperability Through Shared Channels*
   - *Interoperable Communications for Planned Events*
4. Next Steps

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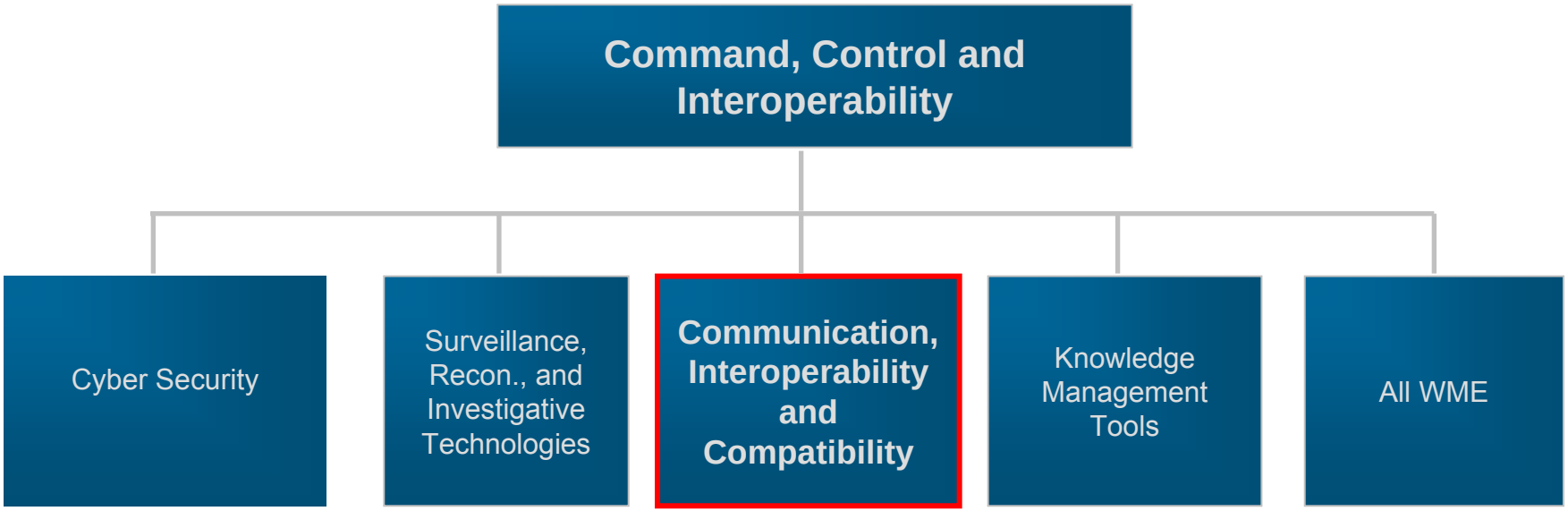
# Command, Control and Interoperability

The mission of the Science and Technology (S&T) Directorate's Command, Control and Interoperability Division is to transform new and promising concepts into real operational capabilities. With its Federal partners, the Division is working to strengthen communications interoperability, improve Internet security and integrity, and accelerate the development of automated capabilities to help identify potential national threats.

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# Office for Interoperability and Compatibility (OIC)

The Office for Interoperability and Compatibility (OIC) is working with the emergency response community and Federal partners to improve local, tribal, state, and Federal emergency preparedness and response. OIC focuses on research, development, testing, evaluation, and standards aspects related to interoperability.

OIC is committed to developing tools—methodologies, templates, models, and educational materials—that effectively meet the critical needs of emergency responders in the field.

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# The Interoperability Challenge

Emergency responders—police officers, fire personnel, emergency medical services—need to share vital voice and data information across disciplines and jurisdictions to successfully respond to day-to-day incidents and large-scale emergencies.

Responders often cannot talk to some parts of their own agencies—let alone across cities, counties, and states. Ineffective communications risk the lives of responders in the field, and can mean the difference between life and death for those awaiting help.

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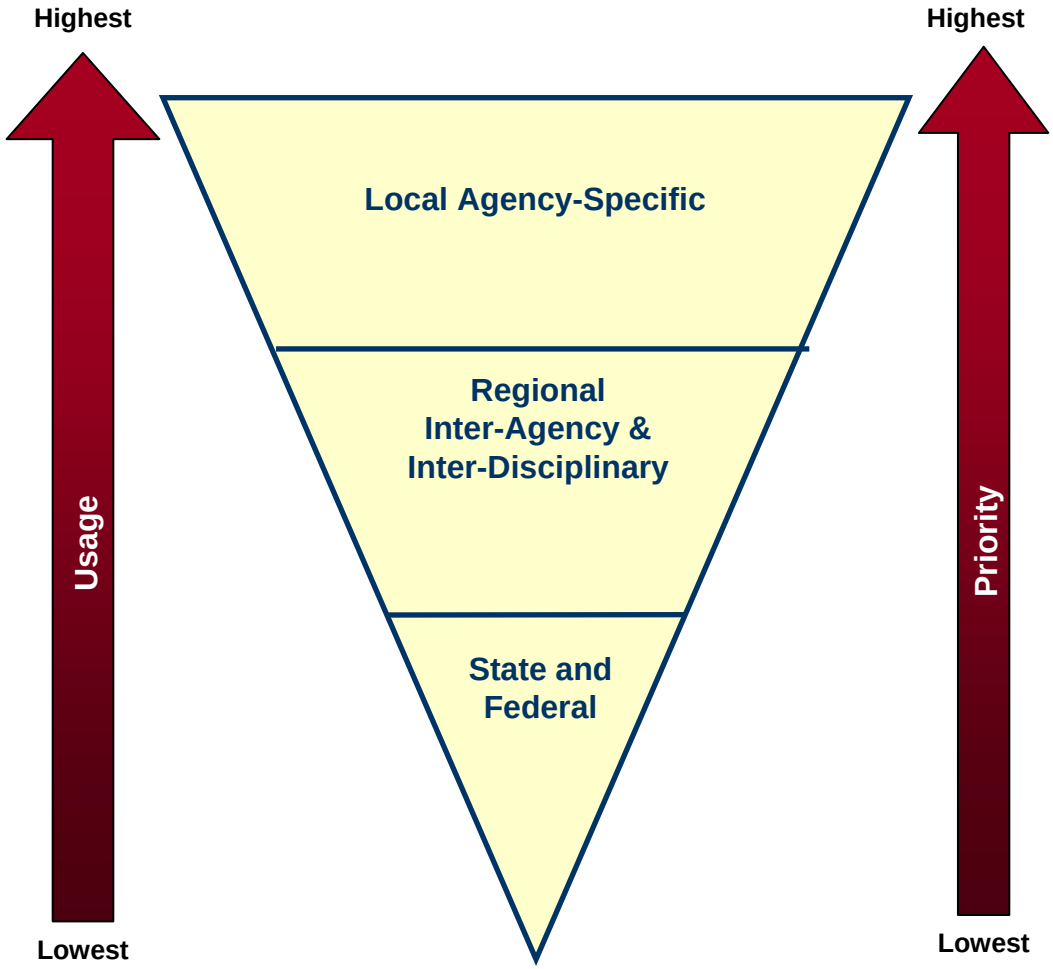
# The Interoperability Challenge

A successful strategy for improving interoperability must be based on user needs and driven from the bottom up.

OIC advocates a unique, practitioner-driven approach. OIC benefits from the critical input of the emergency response community and from local, tribal, state, and Federal policy makers and leaders. This input ensures that OIC resources are aligned with responders' needs.

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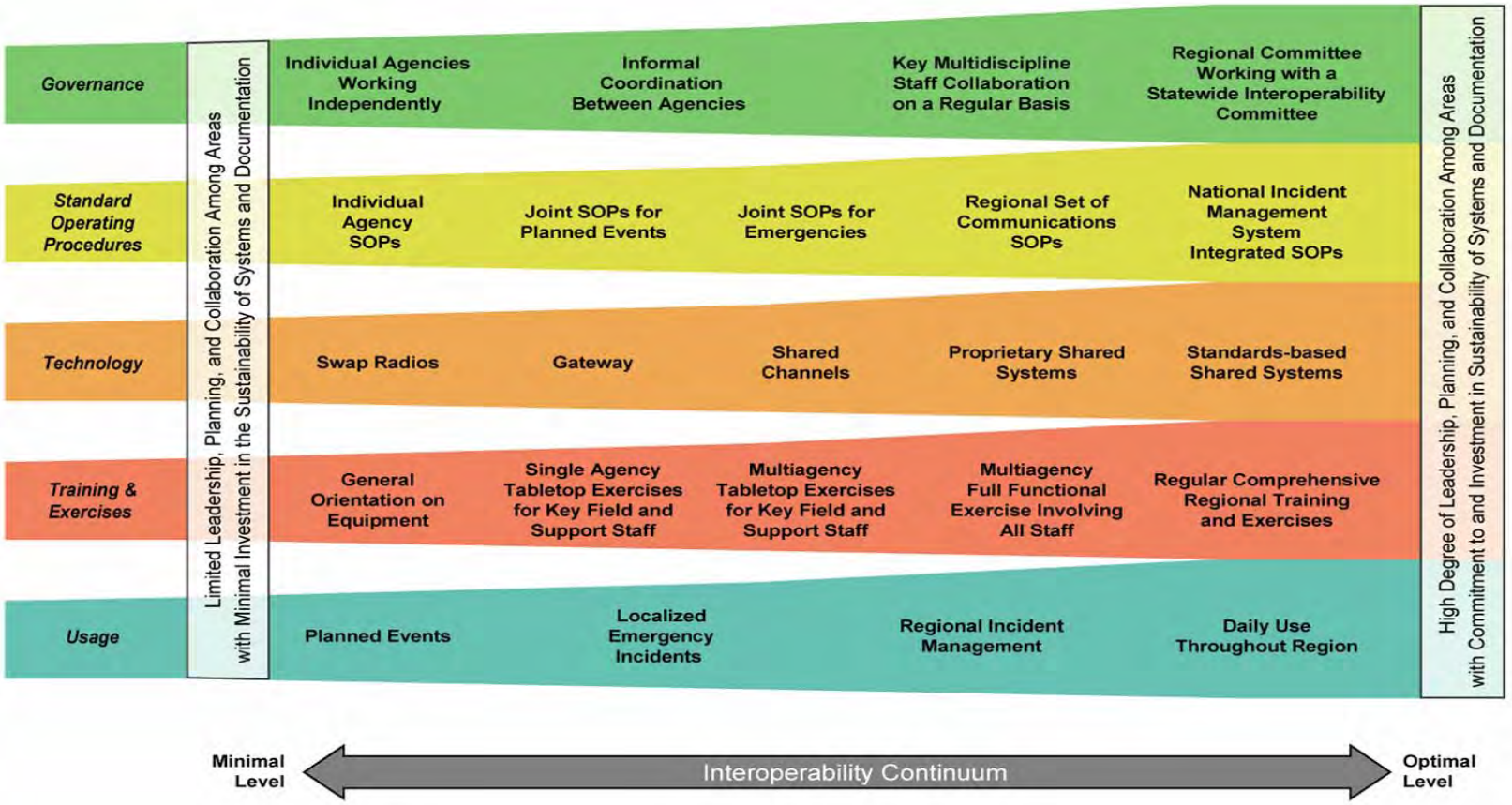
# A Multi Dimensional Challenge

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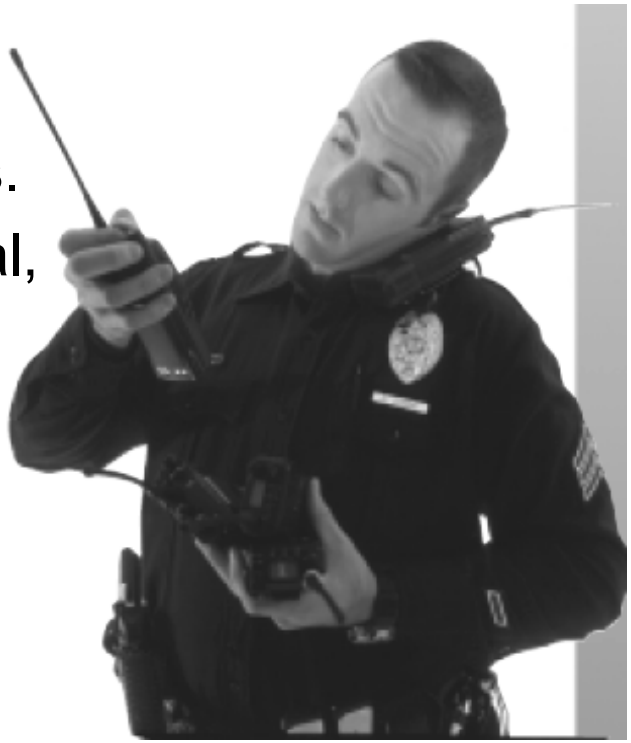
# The Interoperability Challenge

- Interoperability is not solely a technology problem that can be solved with the “right” equipment or the “right” communications system.
- Some technology solutions are useful for command elements, but are hopelessly impractical for individual emergency responders.
- There are not any “silver bullet” solutions.
- Achieving interoperability involves tactical, technological, strategic, and cultural changes.
- OIC publishes tools and methods to help officials enact these changes.



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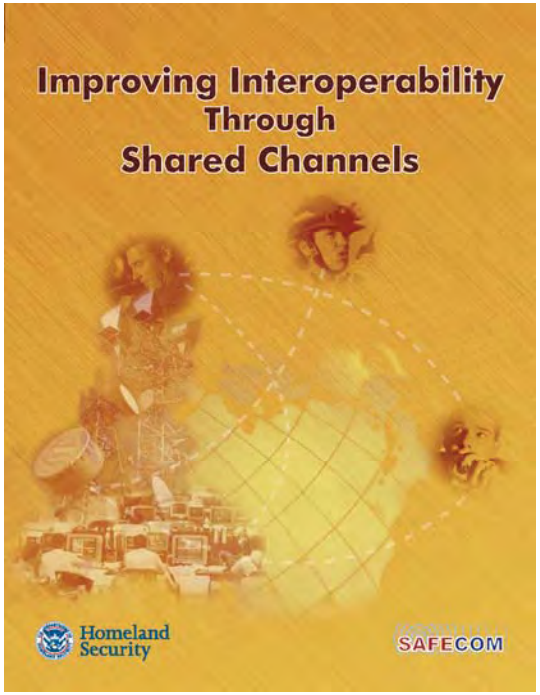
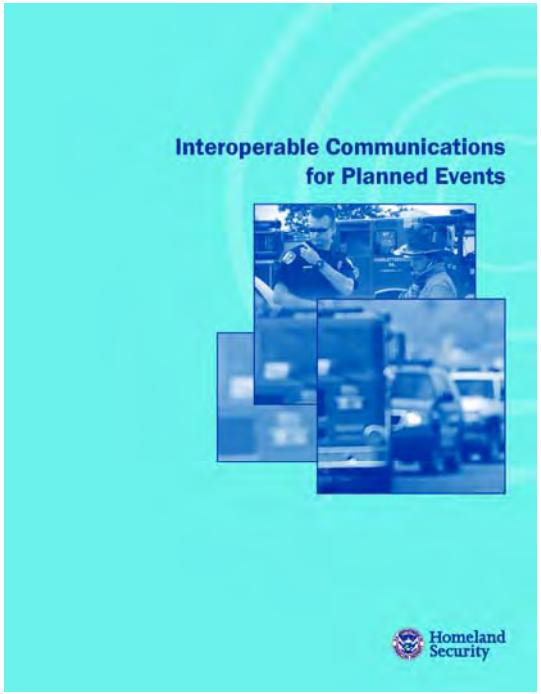
# Recent Tool Publications

OIC has recently released two documents that provide simple and applicable best practices and lessons learned intended to help officials improve local, tribal, state, and Federal communications interoperability.

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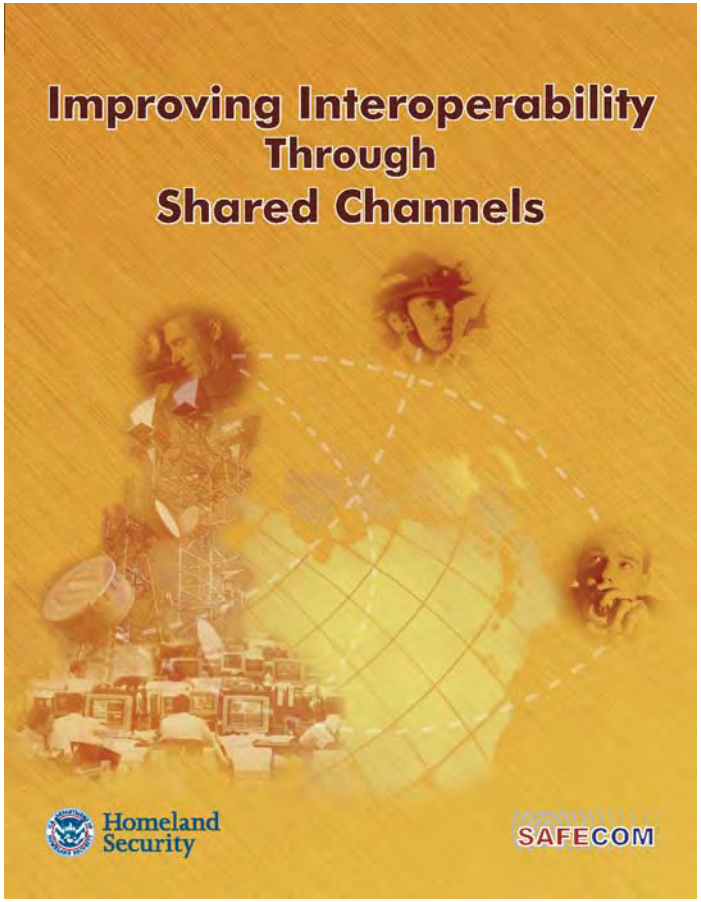
# Improving Interoperability Through Shared Channels

*Improving Interoperability Through Shared Channels* is intended to:

- Create awareness of the shared channel solution for communications interoperability
- Help the emergency response community understand the level of effort, resources, and key actions necessary for implementation
- Provide a set of best practices from existing shared channels implementations

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# Challenge

- Each emergency response agency has unique communications resources, needs, and requirements.
- Agencies and communities have chosen to address their communications needs at various times using a mixture of technical approaches.
- Over the years, these independent decisions created a patchwork of communications systems utilizing agency-specific VHF, UHF, T-Band, or 800 MHz radio frequencies.
- The result is a group of emergency response agencies within a city or region that cannot talk to each other.

# Method

- The guide helps emergency response officials overcome this challenge by presenting a cost and spectrum efficient solution.
- While shared channels have been historically used between agencies in the same discipline (e.g., fire services), this guide is focused on creating a multi-discipline, multi-jurisdictional solution.
- The guide outlines key questions, actions, and considerations for implementing a regional interoperability governance structure, creating a shared channel communications strategy, and rolling out a regional shared channel plan.

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# Provided in the Tool

- A description of technology solutions for interoperability, identifying benefits and limitations
- An introduction to shared channels
- Key questions to consider when deciding to implement a shared channel solution
- Technology considerations
- Key actions for developing and implementing shared channels
- Additional resources—spectrum related information

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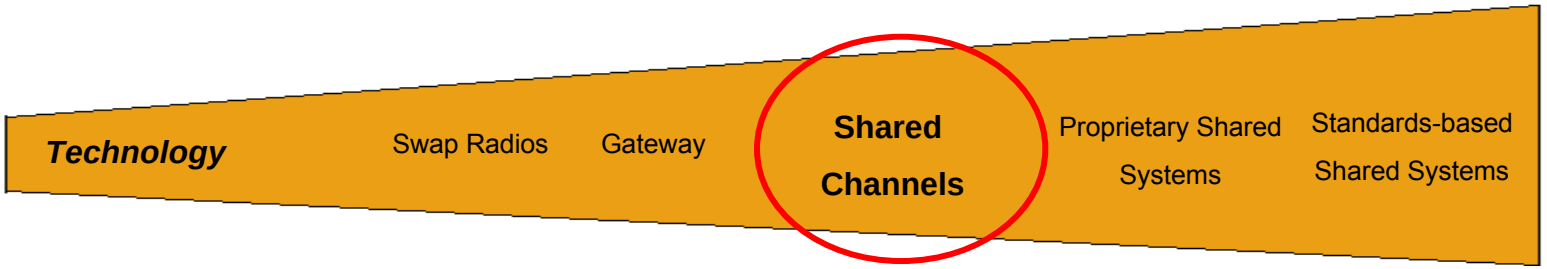
# What are Shared Channels?




- Shared channels consist of frequencies licensed to individual agencies by the Federal Communications Commission (FCC) and allocated by the licensee for use by other agencies for the purpose of interoperability.
- The use of shared channels can improve interoperability by establishing a common frequency over which multiple jurisdictions or disciplines can communicate.

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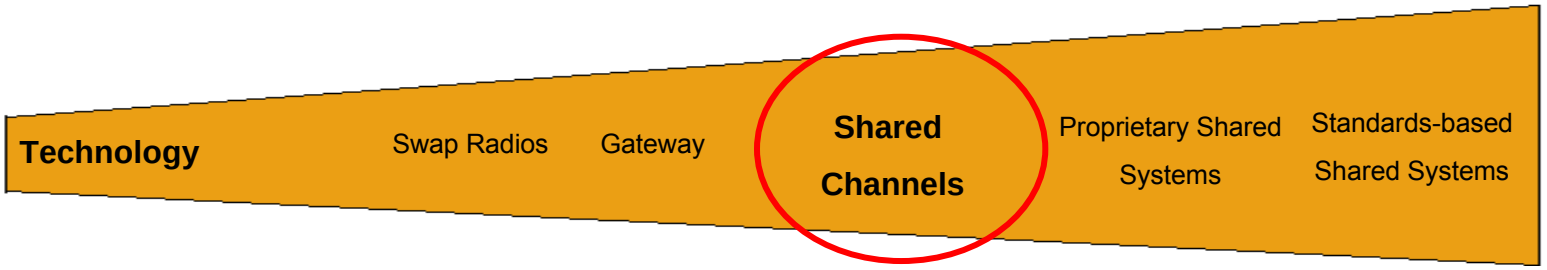
# What are Shared Channels? (Cont'd)




- This solution can be achieved using existing systems and resources as long as the shared channels are pre-programmed into each piece of equipment, and the radios operate in the same frequency band.
- Shared talkgroups are specific radio resources that are shared with other agencies and disciplines throughout a trunked radio system.

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# Shared Channels Key Actions

1. Establish a Governance Structure and Gain the Proper Leadership Commitment
2. Conduct an Operational Assessment
3. Conduct a Technical Assessment
4. Identify Shared Channels and Establish Policies and Procedures
5. Create a Regional Channel or Talkgroup Plan
6. Develop a Regional Memorandum of Understanding (MOU)
7. Program Radios
8. Train and Exercise on the Use of Shared Channels
9. Regularly Use Shared Channels

# Shared Channels Impact

- Emergency response agencies often have the technical elements to become interoperable, yet have not fully assessed its capabilities or engaged in the coordination to make capabilities operational.

- The guide will create awareness of the shared channel solution, a capability inherent in all radios, and provide officials with an understanding of the key actions necessary for implementing the solution.

- A shared channel case study document will be published by DHS in the first quarter of 2008 highlighting shared channel solutions in the state of Montana, the Central Florida region, and the Boston Metropolitan Area.

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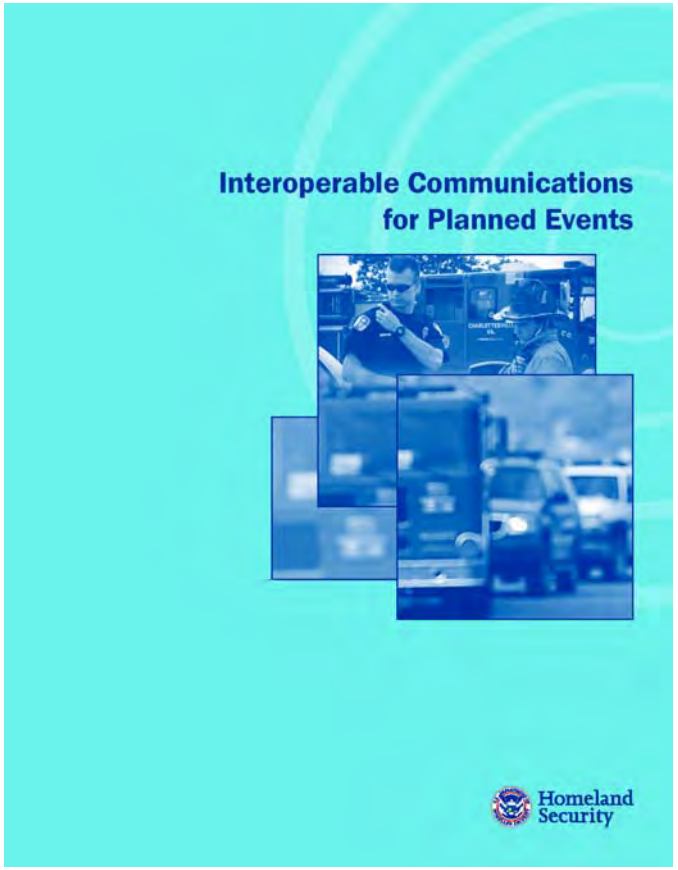
# Interoperable Communications for Planned Events

*Interoperable Communications for Planned Events* is intended to:

- Assist emergency response officials in designing and executing communications plans for planned events.
- Provide best practices and lessons learned gathered from practitioners across the country.
- Give a methodology for using planned events as a way to test equipment in real-life situations and better prepare for unplanned future events.

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# Challenge

- Emergency response agencies often support planned events without a solid leadership team, communications plan, or training, thereby leading to an inefficient operation or possible confusion between staff.
- Planned events are unique opportunities for emergency response officials because they require a different set of skills than everyday events.
- Agencies tend to support planned events without documenting their work, failing to capture lessons learned for future events.
- Planned events provide an opportunity to train and use communications equipment needed during unplanned or everyday events.

# Method

- Created a set of actions and considerations for emergency response officials responsible for planning communications support

- Gathered a set of best practices and lessons learned based on practitioner input from Thunder Over Louisville, Super Bowl XLI – Miami, Super Bowl XXXIX –Jacksonville

- Included a continuous improvement loop to help officials use gaps and lessons learned from previous events to guide officials in future planned and unplanned events

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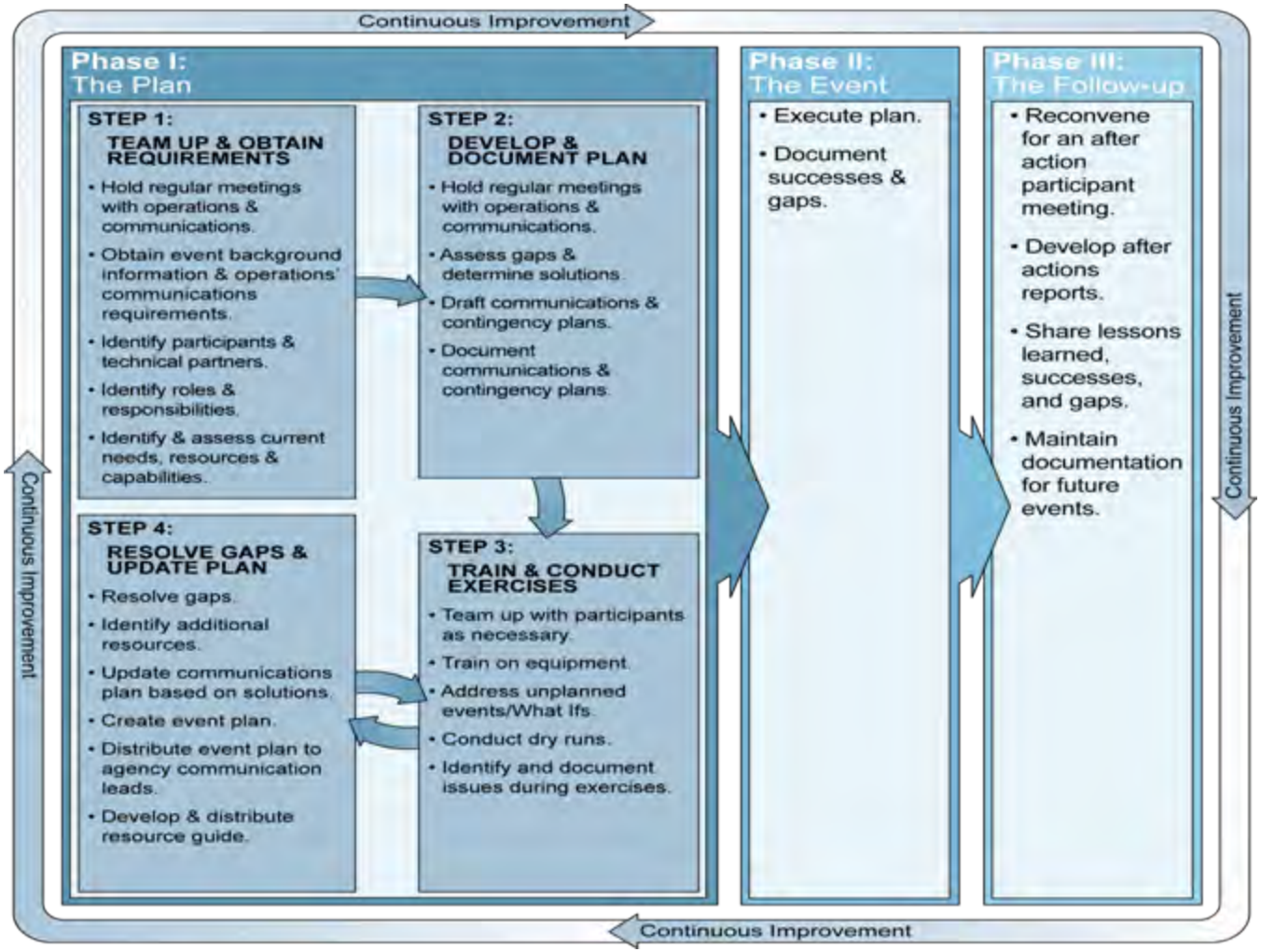
# Provided in the Tool

- Planned Events Interoperable Communications Process
  - Phases, steps, and key considerations
  - Continuous Improvement
- Lessons Learned
- Best Practices

# Planned Events Preparation

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# Planned Events Preparation (Cont'd)

- Phase 1: The Plan
  - Step 1: Team Up & Obtain Requirements
  - Step 2: Develop & Document Plan
  - Step 3: Train & Conduct Exercises
  - Step 4: Resolve Gaps & Update Plan

- Phase 2: The Event

- Phase 3: The Follow-up
  (Continuous Improvement Throughout)

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# Interoperable Communications for Planned Events Impact

- This guide helps officials increase overall awareness of the existing voice and data communications interoperability capabilities in their area.

- The importance of establishing relationships with surrounding communities and developing committees comprised of leaders from the local, tribal, state, and Federal agencies to develop the event communications plans is stressed.

- Agencies can begin to identify gaps and implement improvements to increase interoperability for future events.

- Officials can develop and execute successful interoperable communications plans for the next planned event.

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# Next Steps

- Pick up, share, and use copies of each document after the session
- More tools and methods available on the SAFECOM Web site at www.safecomprogram.gov

Homeland Security

# Homeland Security

## Science and Technology

# Current S&T Business Opportunities

**Ms. Wanda Armwood**
**Associate Director**
**Office of Procurement Operations**
**S&T Acquisition Division**
**Mission Support Branch**

Homeland Security

# Current S&T Business Opportunities

- Current Solicitations
  - Small Business Innovation Research (SBIR) Program
  - Long Range Broad Agency Announcement (BAA)

# SBIR FY 8.1 Solicitation

- Restricted to Small Business Concerns
- Full Proposals Accepted thru February 4, 2008
- Deadline for Receipt of Proposals - 4:30pm EST
- Contract Awards
  - Phase I - Proof of Concept ($99,999)
  - Phase II – Well-defined Prototype ($750K)
  - Phase III - Further Prototype Development ($TBD)

# SBIR FY 8.1 Solicitation

- Five Topic Areas
  - H-SB08.1-001 Assess Ability to use Eye Tracking and Pupil Dilation to Determine Intent to Deceive
  - H-SB08.1-002 Miniature Chem/Bio/Explosive Sensors
  - H-SB08.1-003 Mapping of Long-term Threats, Vulnerabilities, and Impacts
  - H-SB08.1-004 Trace Explosives Sampling for Vehicle Borne Improvised Explosives Device (VBIED) Detection
  - H-SB08.1-005 Smart Sensor System

Homeland Security

# SBIR FY 8.1 Solicitation

Department of Homeland Security
Office of Procurement Operations
S&T Acquisition Division
Mission Support Branch
Ms. Elizabeth Moya, SBIR Team Lead
Elizabeth.Moya@dhs.gov

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# Long Range BAA Solicitation 08-01

- Full and Open Competition
- White Papers and/or Full Proposals accepted until December 31, 2007
- Contract Award – one, some, or none
- Award Type – Contract, Grant, Other Transaction Agreement
- Potential Offerors
  - Must register at www.hsarpabaa.com
  - Must transmit White Paper and Full Proposal via the website

# Long Range BAA Solicitation 08-01

- Six Topic Areas
  - **Explosives Countermeasure**
  - **Chemical and Biological**
  - **Border and Maritime Security**
  - **Command, Control, & Interoperability**
  - **Human Factors**
  - **Infrastructure Protection**

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# Long Range BAA Solicitation 08-01

- Limitations
  - Basic and applied research
  - Advanced technology not related to a specific system or hardware solution/procurement
  - Excludes non-research procurements (all support services)

# Long Range BAA Solicitation 08-01

- Process – Potential Offerors
  - Download solicitation located at website.
  - Communicate capabilities and ideas to S&T
  - Register and submit white papers and full proposals through www.hsarpabaa.com

# Long Range BAA Solicitation 08-01

- Process – Technical Evaluation Panel
  - Evaluate White Papers and Full Proposals
  - Recommend Award(s)
    - Selected – Funded
    - Selected – Not Funded
    - Not Selected
  - Forward written evaluation report and award recommendation to Contracting Officer

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# Long Range BAA Solicitation 08-01

- Process – Contracting Officer
  - Review Evaluation Report and Proposal
  - Negotiate with Offeror
  - Award contracts
  - Notify offerors

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# Long Range BAA Solicitation 08-01

Department of Homeland Security
Office of Procurement Operations
S&T Acquisition Division
Mission Support Branch
Ms. Linda Mulligan, Business Point of Contact
Linda.Mulligan@dhs.gov

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# Long Range BAA Solicitation 08-01

## S&T Points of Contact


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S&T-HumanFactors@dhs.gov

David Boyd
S&T-C2I@dhs.gov

Jim Tuttle
S&T-Explosives@dhs.gov

Chris Doyle
S&T-InfrastructureGeophysical@dhs.gov

John Vitko
S&T-ChemBio@dhs.gov


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# Current S&T Business Opportunities

- **FedBizOps Website – www.fbo.gov**
- **HSARPA BAA Website – www.hsarpabaa.com**
- **SBIR Website - www.sbir.dhs.gov**
- **Grants Website – www.grants.gov**

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# QUESTIONS?

# Office of Procurement Operations

Science and Technology (S&T)
Stakeholders Conference

***January 14, 2008***

Homeland Security

# Office of Procurement Operations

- Provider of grants, procurement, and acquisition management services to operational entities reporting to the Office of the Secretary
- Provider of a full range of acquisition services for department-wide acquisition initiatives identified by both the Chief Information Officer and the various strategic sourcing commodity councils within DHS
- Eighth Head of Contracting Activity (HCA) with the most diverse customer base in DHS
  - Committed to establishing our organization as a leader in the effective and efficient delivery of acquisition services in support of the DHS mission

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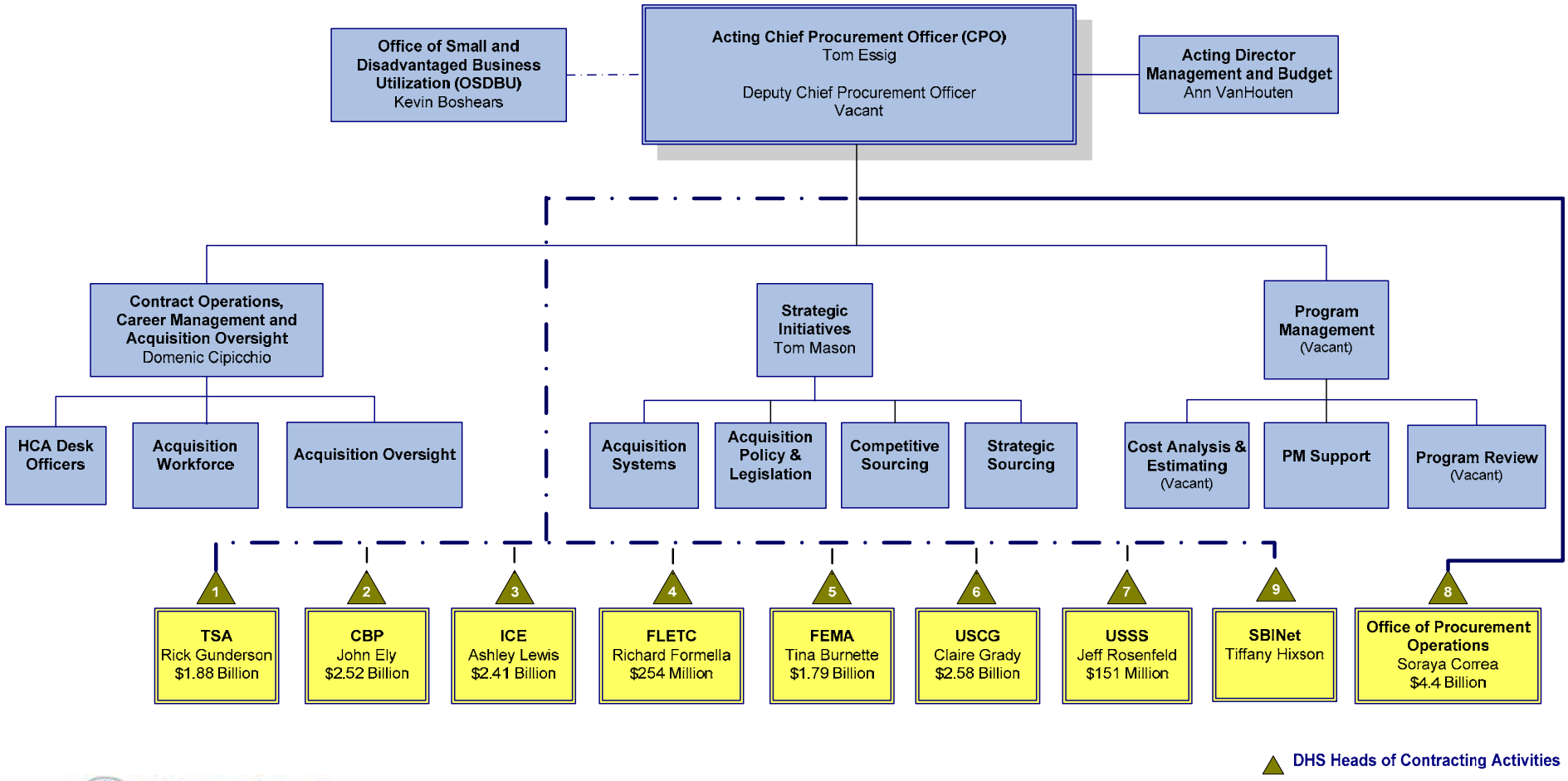
# Chief Procurement Officer (CPO) Organization Structure

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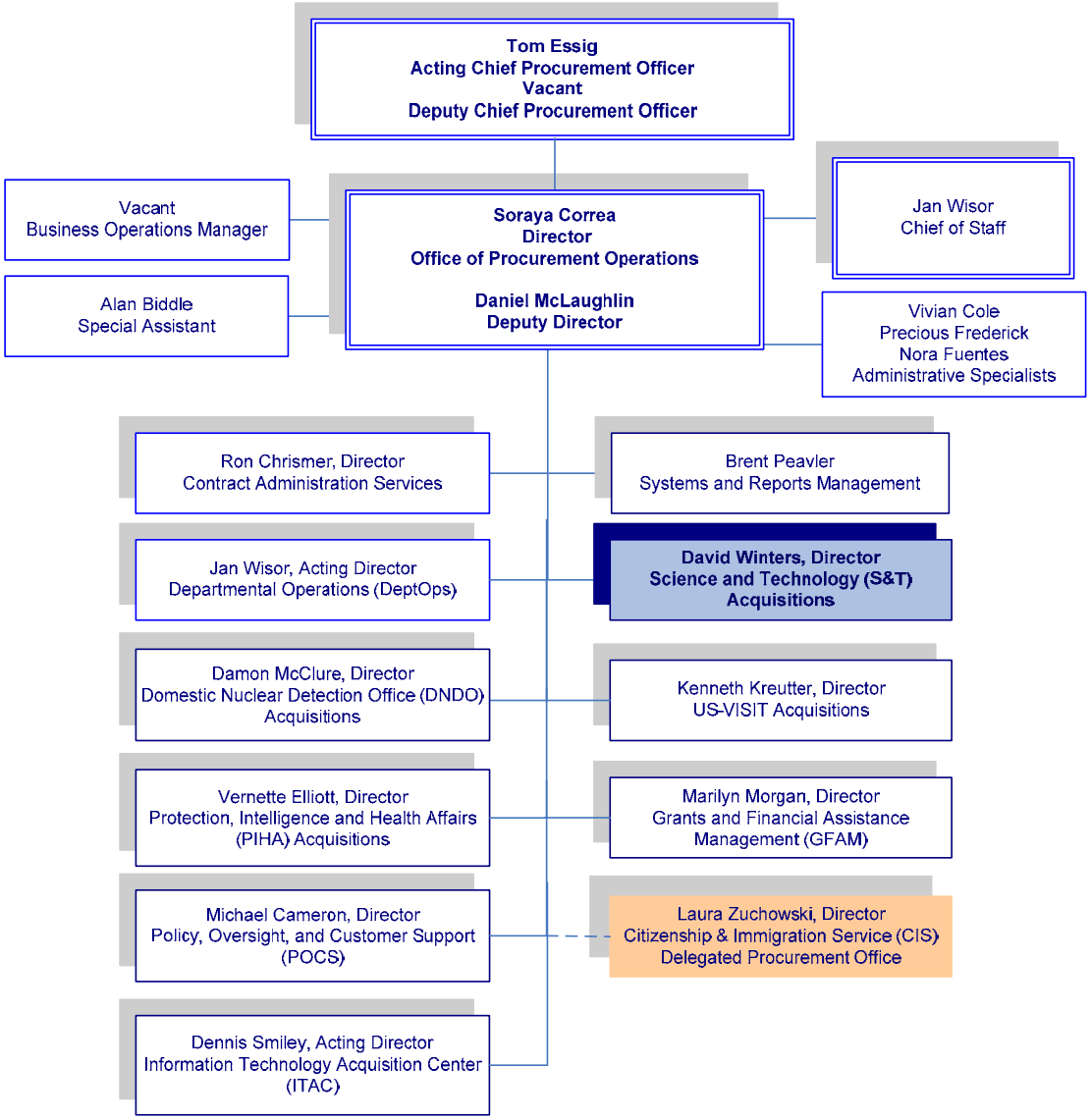
# Office of Procurement Operations Organization Structure

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# Committed to Service

## Our Values

*Teamwork*
We communicate actively and openly with each other and with all whom we serve. We value and respect the contributions of others.

*Integrity*
We take responsibility for our actions and keep our word.

*Professionalism*
We conduct ourselves in a professional, courteous manner that reflects well on our agency.

*Customer Service*
We are committed to helping customers achieve their mission. We work to serve our customers efficiently and exceed their expectations.

*Excellence*
We strive for excellence and are committed to continuous quality improvement. We take pride in providing the highest quality, professional service.

Office of the Secretary ● Undersecretary for Management ● Undersecretary for Science and Technology ● Undersecretary for Policy ● Undersecretary for Preparedness ● General Counsel ● Assistant Secretary Legislative & Intergovernmental Affairs ● Assistant Secretary Public Affairs ● Chief Financial Officer ● Assistant Secretary Office of Intelligence & Analysis ● Director of Operations Coordination ● Director of Counter-Narcotics Enforcement ● Ombudsman Citizenship & Immigration Services ● Privacy Officer ● Civil Rights/Civil Liberties Officer ● Director of Domestic Nuclear Detection Office ● Coordinator for Gulf Coast Rebuild ● Director Citizenship & Customs Enforcement

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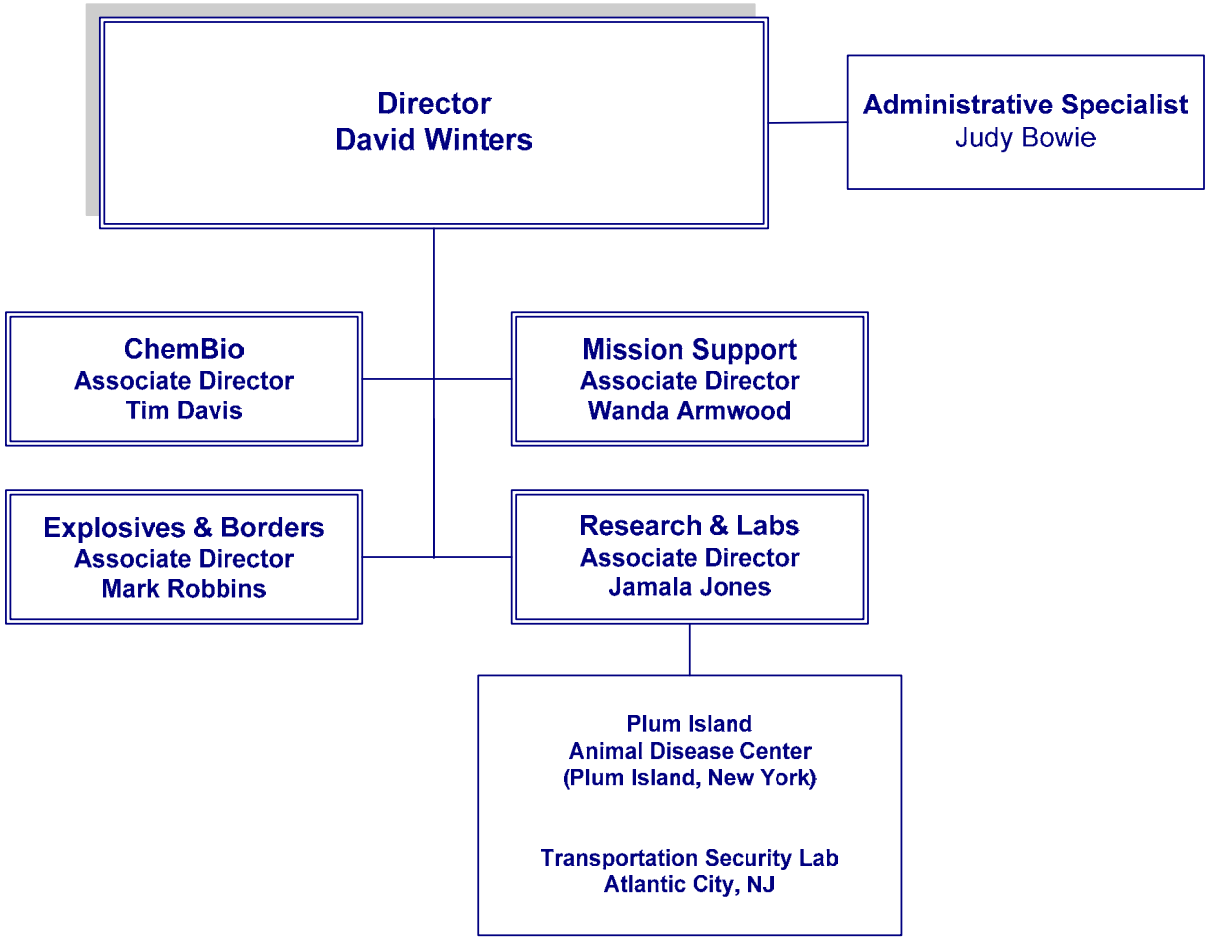
# S&T Acquisitions Division

- Established and aligned to support the Office of the Undersecretary for Science and Technology (S&T)
- Handles a wide range of acquisitions to procure research and development services, cutting edge information technology, and performance based products and services in support of the S&T mission
- Secures services to support the award of grants and cooperative agreements through the Office of Procurement Operations' (OPO) Grants and Financial Assistance Management Division

# S&T Acquisition Division Organization

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# S&T Acquisition Vehicles

## Public Sector

- Interagency Agreements (IAAs) under Economy Act
- Department of Energy (DOE) National Laboratories
- Federally Funded Research and Development Centers (FFRDCs)

## Private Sector

- Contracts awarded under FAR Part 35 published to private industry on FedBizOps
- Small Business Innovative Research (SBIR) Program
- Grants
- Cooperative Agreements
- Universities

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# S&T Acquisition Vehicles (cont'd)

## Public and Private Sector

- Broad Agency Announcements (BAAs)
  - Opportunities published on FedBizOps and Grants.Gov
  - Awards made by Contract or Other Transaction (OT) vehicles
    - When Offeror or Subcontractor is an FFRDC, DOE National Lab, or other Federally funded entity, S&T will work with appropriate sponsoring agency to issue an IAA pursuant to the Economy Act (31 U.S.C. 1531) or other appropriate authority

# S&T FY 2007 Procurement Actions

| FY 2007 S&T PROCUREMENT ACTIONS | |
|---|---|
| ACTIONS | DOLLARS |
| 1,272 | $748 million |

| FY 2007 S&T GRANT AWARDS | |
|---|---|
| AWARDS | DOLLARS |
| 32 | $38.2 million |

| FY 2007 S&T PROCUREMENT ACTIONS (IAAs and OTs) | |
|---|---|
| ACTIONS | DOLLARS |
| 932 | $533 million |

| FY 2007 S&T ELIGIBLE* COMPETED PROCUREMENT ACTIONS | |
|---|---|
| AWARDS | DOLLARS |
| 340 | $215 million |

* Eligible Competed Actions = All procurement actions eligible for competition, excluding Interagency Agreements and Other Transactions

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# S&T Commitment to Small Business

| S&T FY 2007 SMALL BUSINESS ACTIONS | | |
|---|---|---|
| **ACTIONS** | **DOLLARS** | **% of ELIGIBLE* COMPETED DOLLARS** |
| **132** | **$97.9 Million** | **45.6%** |

* Eligible Competed Dollars = All procurement dollars eligible for competition, excluding Interagency Agreements and Other Transactions

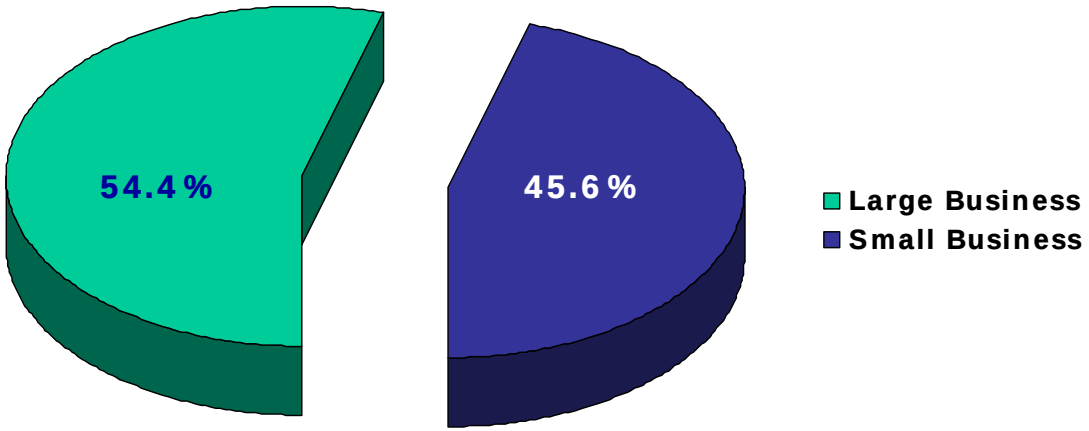


Chart represents total eligible competed dollars ($215 million)

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# FY 2007 Major Accomplishments

- National Biodefense Analysis & Countermeasures Center (NBACC)
  - Awarded Federally Funded Research and Development Center (FFRDC)
- National Bio and Agro-Defense Facility (NBAF)
  - Completed down select to five finalist consortia
  - Finalists currently being evaluated
  - Final site selection anticipated in 2009
- Counter-Man-Portable Air Defense Systems (C-MANPADS)
  - Conducted flight testing of actual prototypes aboard cargo aircraft to assess suitability/adaptability within a civil aviation environment
  - BAE Systems selected to further prototype test and evaluate adaptability to a civil aviation environment

# FY 2007 Major Accomplishments (cont'd)

- Broad Agency Announcements (BAAs) issued for Innovation/HSARPA
  - Project CHLOE Award
    - Contract awarded to Northrop Grumman to provide prototype research and development for technology assessment for the Project CHLOE program
  - Future Attribute Screening Technologies (FAST) Program Award
    - Contract awarded to Battelle Memorial Institute for prototype development of a Mobile Screening Laboratory to support human screening
- Resilient Electric Grid
  - Initiated development of a super conducting cable for the New York financial district

# FY 2007 Major Accomplishments (cont'd)

- Issued two (2) Small Business Innovative Research (SBIR) solicitations for Phases 1 and 2
  - 184 responses to Phases 1 and 2 solicitations
  - Awards to 66 vendors

- Issued Scientific Engineering Technical and Administrative (SETA) services and Lab Support solicitations for BioWatch
  - Award to A-TEK for Lab Support
  - Award to Tauri Group LLC for SETA Services

# Areas of Emphasis for FY08

- Long Range BAA (08-01)
  - First time use by DHS
  - Provides overview of research opportunities
  - Facilitates on-going competition of ideas
  - Proposals accepted, evaluated and awards made throughout the year
  - Open now and expires December 31, 2008
- Rapid Technology Application Program (RTAP)
  - Fulfills expressed needs of first responders
  - Produces advanced technology prototypes 6-18 months after award
  - Acquisition tool for creating rapid prototyping environment
  - Recent example:
    - BAA 08-03 for Explosives Detection RTAP

# Areas of Emphasis for FY08 (cont'd)

- SBIR
  - Solicitation for FY08 Phase 1 issued
    - Proposals due 2/4/08
  - Issue solicitation for FY08 Phase 2
- Issue competitive solicitation for new systems architecture FFRDC
- Participate with S&T customers on Capstone Integrated Project/Process Teams
- Procure IT products and services through EAGLE/FirstSource contract vehicles

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# Working with Industry

- **Contact Us**

  Office of Procurement Operations
  Room 3051, 7th and D Street, SW
  (202) 447-5500

- **Opportunities On-Line**

  Visit DHS.GOV

http://www.dhs.gov/xopnbiz/opportunities

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# S&T Stakeholders Conference

January 14-18, 2008

*Federated Simulation Based Training, Exercise, and Lessons Learned*

***Jalal Mapar***

***Infrastructure & Geophysical Division***

***Science and Technology Directorate***

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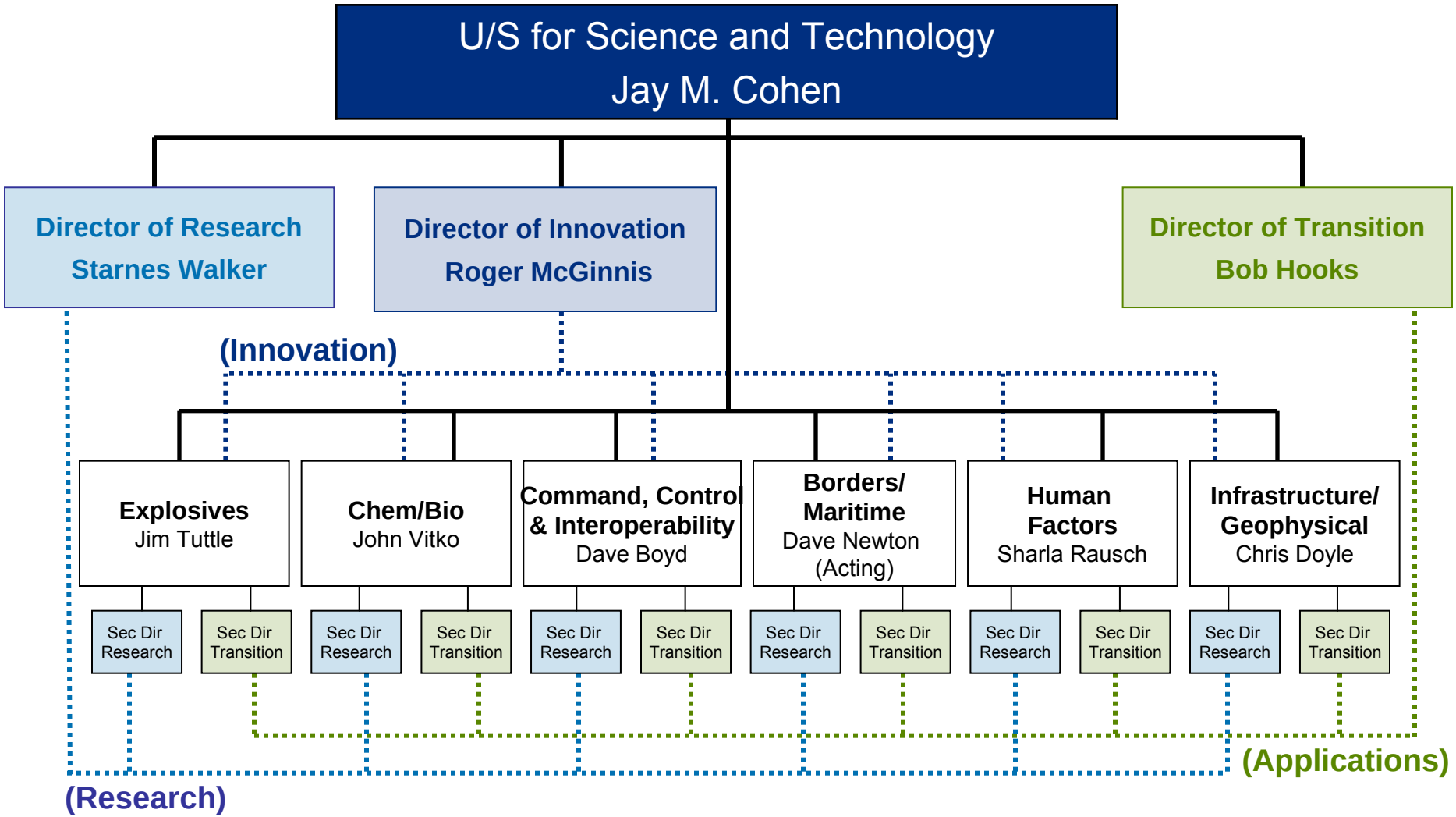
# DHS S&T Directorate

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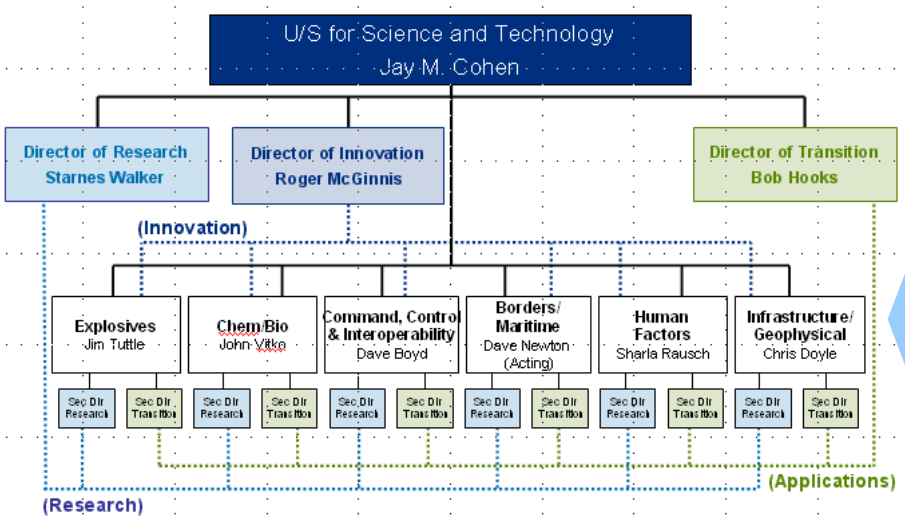
# Infrastructure and Geophysical Division




- Objectives
  - Develop capabilities to identify and mitigate the vulnerabilities of the 17 critical infrastructure and improve the ability of the Nation to prepare for, respond to, and recover from all-hazards emergencies to keep our society and economy functioning
- Program Elements
  - Critical Infrastructure Protection
  - Preparedness & Response
  - Geophysical

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# Preparedness & Response

- Objectives
  - Enhance first responders ability to prepare for, respond to and recover from all-hazards emergencies through development and deployment of enabling technologies
- Customer
  - DHS/FEMA *(primary)*, and others (CBP, CG, TSA, …)
- End-User
  - 44,000 Emergency Response Organizations
  - 18,000 Law Enforcement Agencies
  - 30,000 Fire Departments
  - 83,000 State/Local Governments

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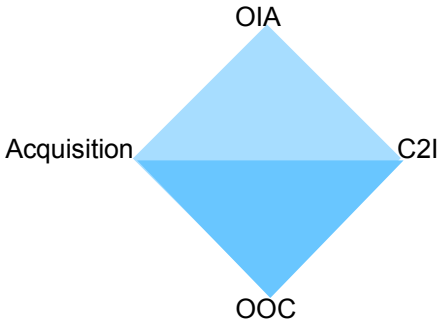
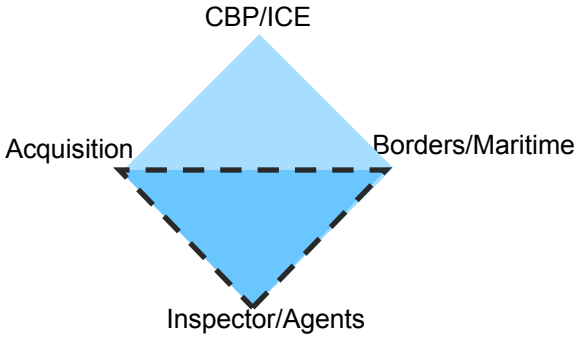
# Homeland Security Capability IPTs

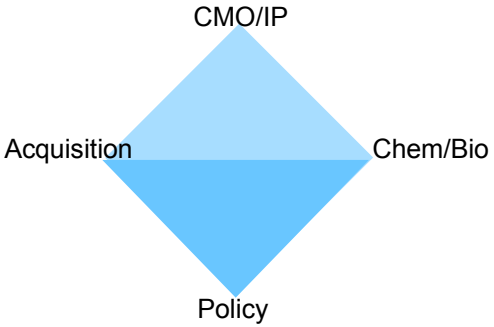
## Information Sharing/Mgmt



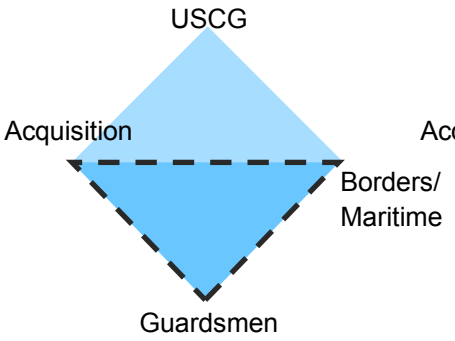

## Border Security



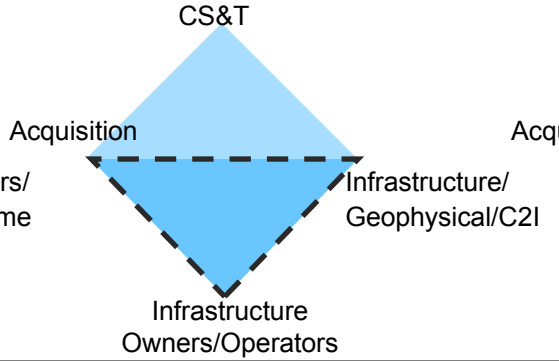

## Chem/Bio Defense



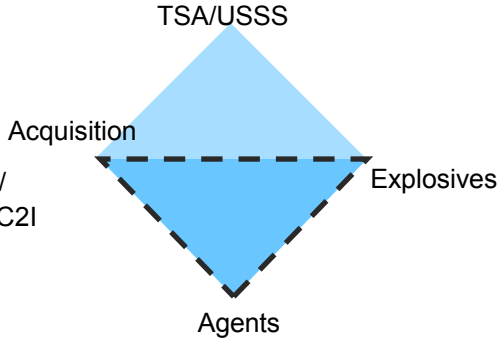

## Maritime Security



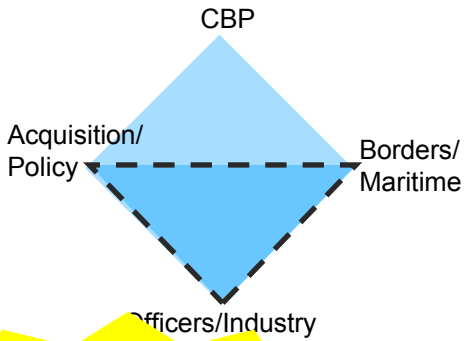

## Cyber Security



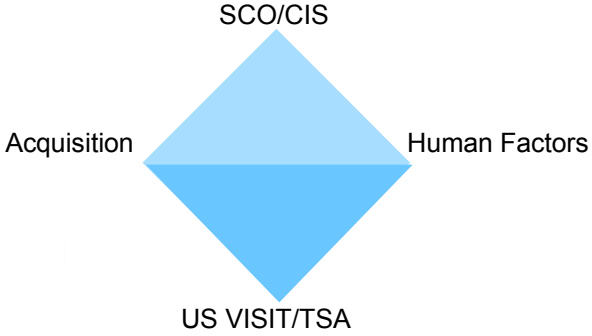

## Explosive Prevention



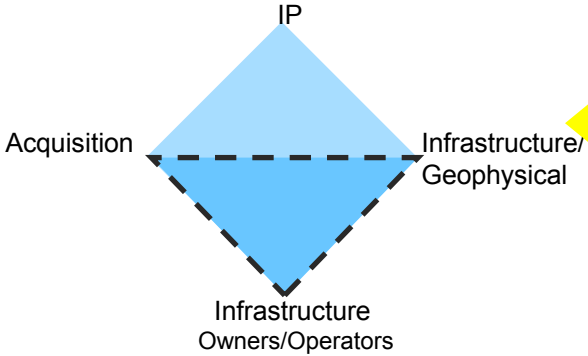

## Cargo Security



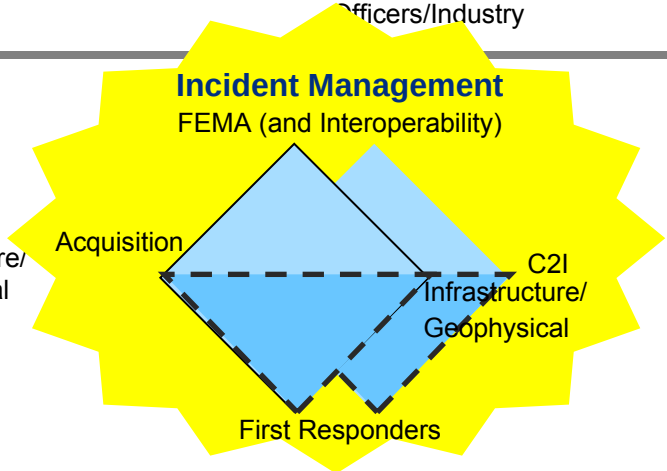

## People Screening




## Infrastructure Protection




## Incident Management



# Incident Management IPT

- **Capstone IPT Leads are from FEMA and S&T**
  - FEMA: Ret. VADM Harvey Johnson, Deputy Director/COO
  - S&T: Chris Doyle, Director, Infrastructure and Geophysical Division
- **Participants**
  - FEMA (primary), CBP, USCG, TSA, ICE, USSS
- **Process**
  - Several rounds identified prioritized capabilities
    - *S&T Projects established to develop technologies for out years*
- **Outcome**
  - Resource-constrained, prioritized list of out-year Capability gaps and Project areas

***Simulation Based Incident Planning and Response***

***1st Responder Equipment***

***Common Operating Picture & Situational Awareness***

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# Preparedness & Response

***Infrastructure and Geophysical***

***Preparedness & Response***

**Integrated Modeling, Mapping, & Simulation**

**Emergency Responder Technology**

- *Responder Tracking System*
- *Physiological Monitoring System*

**Incident Management Enterprise**

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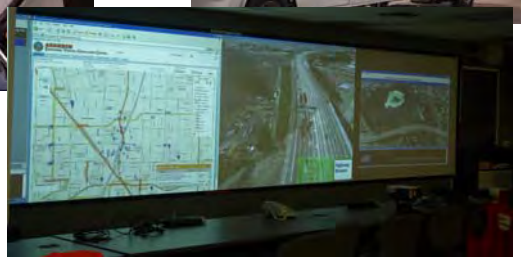
# Filling The Capability Gap (S&T Style)

***IM IPT Stakeholder Requirements***

*•Training for Unified Incident Commanders and other Multi-Agency Emergency Managers*

*•Modeling and Simulation for State, Tribal and Local Emergency Planning*



***S&T P&R Portfolio (Programs)***

**Integrated Modeling, Mapping, & Simulation**

**•Simulation Based Incident Planning and Response**

**•Simulation Based Training, Exercise & Lesson Learns (TELL)**

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# Federated Simulation Based Training

- **Simulation-based exercises offer an improvement to multi-jurisdictional training exercise programs**
  - Ability to train on a recurring basis
  - Provide a mechanism to show the responder the downstream consequences to his/her decision
  - Cost affordable and complement to live-exercise
  - Will potentially stimulate more opportunities for exercise
  - Simulations can also roll up all the performance metrics from a multi-jurisdictional exercise into a single location
  - Provide the ability to complete aggregated assessment of larger-scale operations

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# Federated Simulation Based Training

- **Simulation-based exercises contrast with table top**
  - Not scripted, runs in real-time, uses actual communication media
  - Geographical features: topography, floors, tunnels, water, fire, etc.
  - Simulating on-scene personnel, eliminating need to take first responders off the job while commanders participate in exercise
  - Playback facilitates individual/collaborative review of decisions
- **Requirements**

- **Katrina White House report**
  - Recommendation 110: *DHS should consolidate homeland security related training and exercise assets in a new Office of Training, Exercises and Lessons Learned (TELL) during FY06. Key components should include, but not be limited to: Noble Training Center, Center for Domestic Preparedness, National Emergency Training Center, National Exercise and Evaluation Program.*
  - Recommendation 111: DHS should support the use of simulation and modeling to assist in the development of operational procedures and exercises (particularly those based on catastrophic incidents) and as a resource to assist in responding to catastrophic incidents. Simulations of this type should be run out of the SIMCEN."

- **9 11 Commission Report**
  - "In the future, the Department of Homeland Security should consider making funding contingent on aggressive and realistic training in accordance with ICS and unified command procedures."
  - "Private-sector preparedness is not a luxury; it is a cost of doing business in the post-9/11 world. It is ignored at a tremendous potential cost in lives, money, and national security."
  - "The Department of Defense and its oversight committees should regularly assess the adequacy of Northern Command's strategies and planning to defend the United States against military threats to the homeland."

- **Project Responder**
  - Reduce cost and complexity of training for decision making
  - Easy method to bring responders together
  - Use validated models to better reflect the true nature of the emergency
  - Use same analysis models for training
- **National Response Plan**
  - Integrate the capabilities and resources of various governmental jurisdictions, incident management and emergency response disciplines, NGOs), and the private sector into a cohesive, coordinated, and seamless national framework for domestic incident management

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# Federated Simulation Based Training

- **DHS S&T has developed a concept prototype for a federated Simulation based Training Exercise & Lessons Learned (TELL)**
  - Live, Virtual, Constructive system
  - Supports continuous improvement of our Nation's preparedness to respond to catastrophic events, as called for in HSPD-8
  - Allows responders at all levels to affordably train and exercise for large and complex events in a virtual/constructive/live environment
  - System will link multiple agencies, functions, and jurisdictions to improve preparedness for emergency responders and managers
    - *Become more proficient in their decision making capabilities*
  - Incorporates training objectives, scenarios, and metrics
  - Addresses the successful implementation of NIMS and the ability to conduct quick, repeatable, economical, and effective means of training incident commanders so they can be better prepared to handle complex incidents

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***Train to Respond, Respond as Trained***

# Federated Simulation Based Training

- **TELL Concept operates off distributed simulation centers**

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# Federated Simulation Based Training

**Video Clip**

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# Current and Future Plans

- **Recent TELL Exercises**
  - Golden Guardian 2007, Anaheim, CA
    - *Anaheim PrepEx –The TELL system was used in a exercise that trained Incident Command Teams for the CA Golden Guardian exercise*
- **Future plans**
  - Deploy/conduct training in a tri-state region
  - Investigate, use, develop, integrate other technologies
    - *Interoperable modeling and simulation framework*
    - *Smart models (entities with behavior)*
    - *Knowledge management to enhance Lessons Learned*
    - *Connectivity to other communities*

*"This did not feel like an exercise, I felt like I was responding to a real event"*

Tim O'Hara - Anaheim Battalion Chief

*"It builds knowledge through experience, the way core knowledge is really learned"*

Tom Wood - Anaheim Assistant City Manager

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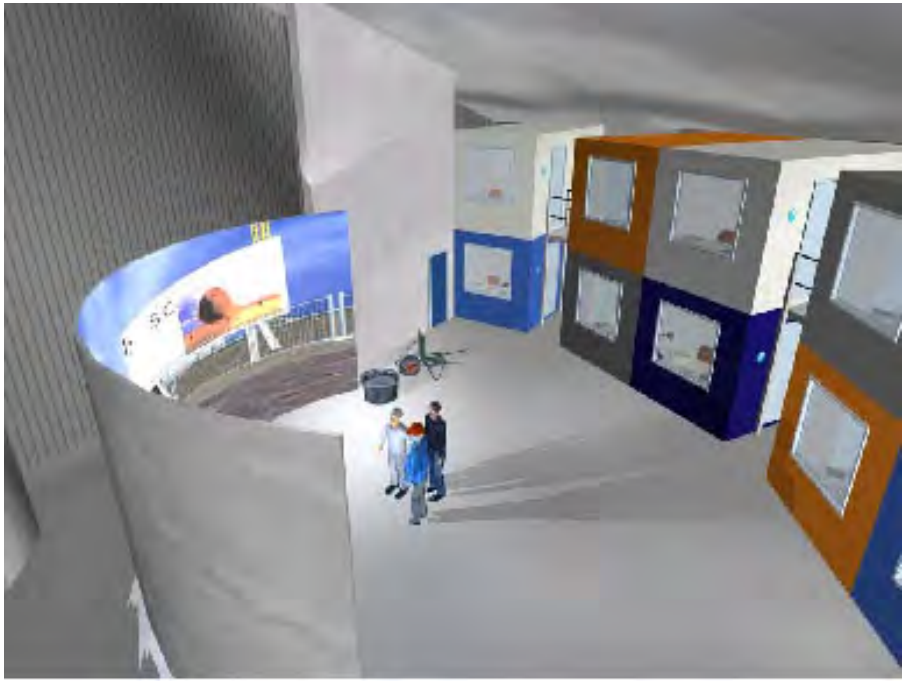
# TELL- Integrated Modeling, Mapping, & Simulation (IMMS)

- **TELL supports IMMS**
  - Becomes part of our Simulation based incident planning and response
    - *Non-real-time analysis capability using the same TELL models*
    - *Integrated system to support emergency managers, and decision makers to better understand, be prepared, and plan for emergency operations*
  - Modeling elements will focus on all possible hazards (natural and terrorist)
    - *Predictive*
    - *Mass evacuation route mapping*
    - *Impact analysis*



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U.S. DEPARTMENT OF HOMELAND SECURITY

Homeland Security

# “Crisis Communications: State Models and Gaps”

Homeland Security S&T Stakeholders West

*January 14, 2008*
*Los Angeles, Calif.*

Chris Logan
Program Director
Homeland Security and Technology
National Governors Association
Center for Best Practices

NGA Center for BEST PRACTICES

# Overview

- Definition of “good” crisis communications.
- “Gaps” through case studies.
- Who does it well?
- What we tell governors.
- Challenges.
- Wrap up/take-aways.

NGA Center for BEST PRACTICES

# What is “good”?

Good Crisis Communications:

- Builds trust.
- Effectively controls rumors/competing information.
- Results in desired behaviors.

NGA Center for BEST PRACTICES

# When it all goes wrong…

- Anthrax, October 2001
- SARS, November 2002 – August 2003
- Hurricane Katrina, Autumn 2005

NGA Center for BEST PRACTICES

# ANTHRAX

- Lack of scientific/medical spokespersons.
- Incomplete information.
- Inaccurate information.
- Perception of disparity in response.
- Allegations of racism.
- Lack of trust in government.

# SARS

- Initial coverup by foreign governments.
- Misinformation re: outbreak control.
- “Messaging” resulted in stigmatization.
- “Voluntary quarantine” not quite “voluntary.”
- Lack of trust in government.

# Hurricane Katrina

- Message not tied to effective action.
- Special populations not considered.
- Perception of abandonment.
- Lack of trust in government.

# Those who do it well, do it often.

- California: wildfires, earthquakes.
- Florida: tropical storms, hurricanes.
- Tornado alley.

NGA Center for BEST PRACTICES

# Measures of “success.”

- Trust.
- Rumor control.
- Desired behavior.

NGA Center for BEST PRACTICES

# What do we tell governors?

- Ensure adequate planning.
- Own the situation.
- Be accurate.
- Explain actions and strategies.
- Set an update schedule.
- Tell people what they can do.

# Gaps and Challenges

- Alternative sources.
- 24-hour news cycle.
- Multiple audiences.
- Multiple messengers.
- Message fatigue.

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# Strategies

- Use National Incident Management System (NIMS)
- Use Joint Information Centers
- Establish relationships.
- Engage the media.

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# What should you remember?

- Crisis Communications is part of a sound overall strategy.
- The goal is “desired” behavior: action or restraint.
- Trust *is the key*.
- Accuracy builds trust.
- Empowers the people.

NGA Center for BEST PRACTICES

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Program Director, Homeland Security
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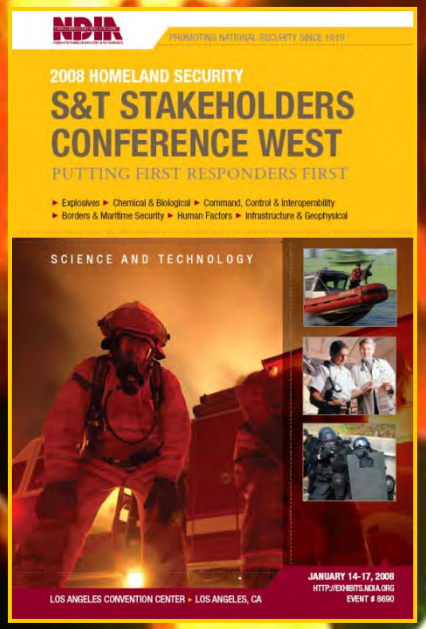
NGA Center for BEST PRACTICES

# Detection Technologies Primer

An introduction to some current and emerging technologies




**David Hernandez**
**Transportation Security Laboratory**
**Science & Technology Directorate**
**U. S. Department of Homeland Security**

***"Putting First Responders First"***

Homeland Security
Science & Technology

# Introduction

- Types of Detection
- Common elements
- Detection technologies
- Conclusion

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# Types of Detection

- Bulk Detection-requires a significant mass of material to interrogate.
  - Detection can be based upon
    - Statistical model (might be explosive)
    - Specific property (atomic, molecular, or crystalline structure)
- Trace detection
  - Uses analytical tools that identify specific molecules
  - Can detect residue

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*Reference herein to any specific commercial products, processes, equipment, or services does not constitute or imply its endorsement, recommendation, or favoring by the United States Government or the Department of Homeland Security (DHS), or any of its employees or contractors.*

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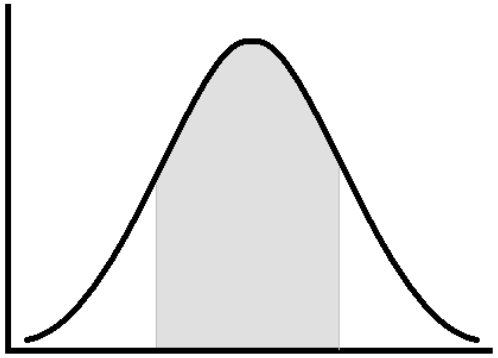
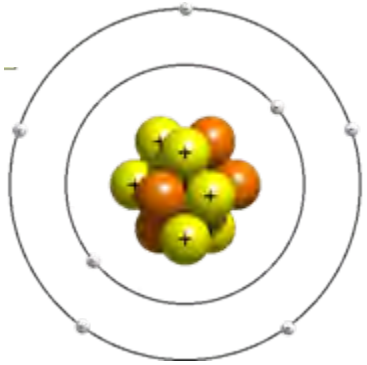
# Bulk Detection

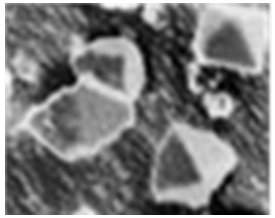
- By statistical model
  - Probability that interrogated material is a threat.



- By specific property
  - Molecular or atomic information



- By structure



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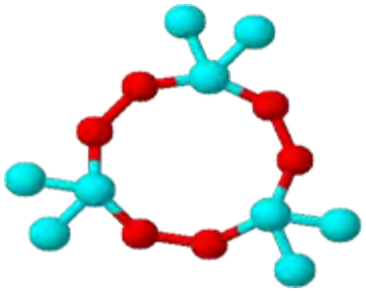
# Trace Detection

- Can be solid (particulate) or gas (vapor) phase.
  - ppm, ppb, or even ppt
- Identifies explicit composition



TATP

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# Common elements

- Many explosives contain Carbon, Hydrogen, Nitrogen, and Oxygen
  - CHNO
- Density
  - Explosives output is dependent upon multiple factors
    - Usually-higher density=higher velocity

| Substance / Explosive | ρ ($g/cm^3$) | %C | %H | %N | %O |
|---|---|---|---|---|---|
| TNT | 1.4 | 37 | 2 | 19 | 42 |
| RDX | 1.8 | 16 | 3 | 38 | 43 |
| HMX | 1.9 | 16 | 3 | 38 | 43 |
| PETN | 1.7 | 19 | 3 | 18 | 60 |
| NG | 1.6 | 16 | 2 | 19 | 63 |
| EGDN | 1.5 | 16 | 3 | 19 | 63 |
| TATP | 1.6 | 48 | 9 | 0 | 43 |

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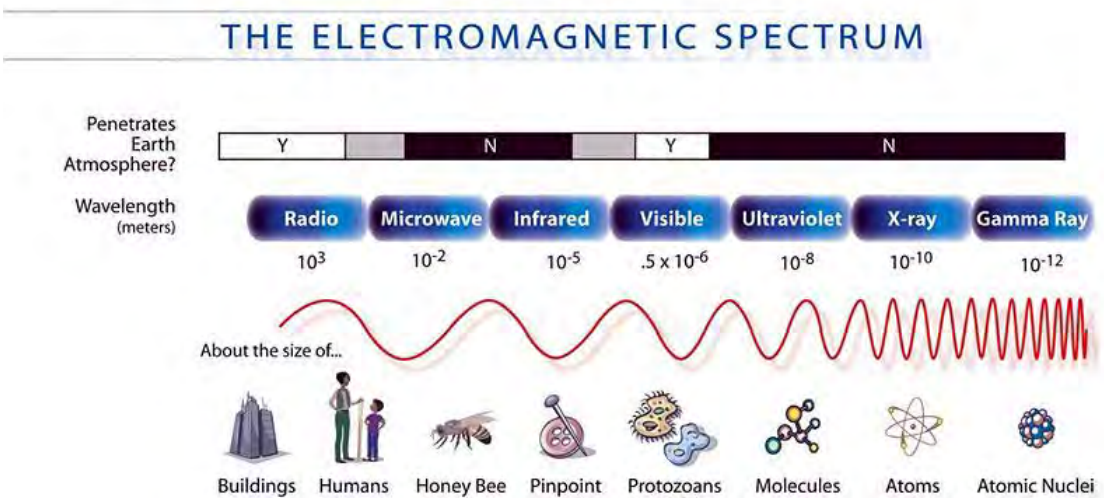
# Detection technologies

- X-ray
- Gamma
- Neutron
- Vibrational
- Spectroscopy
- Visual

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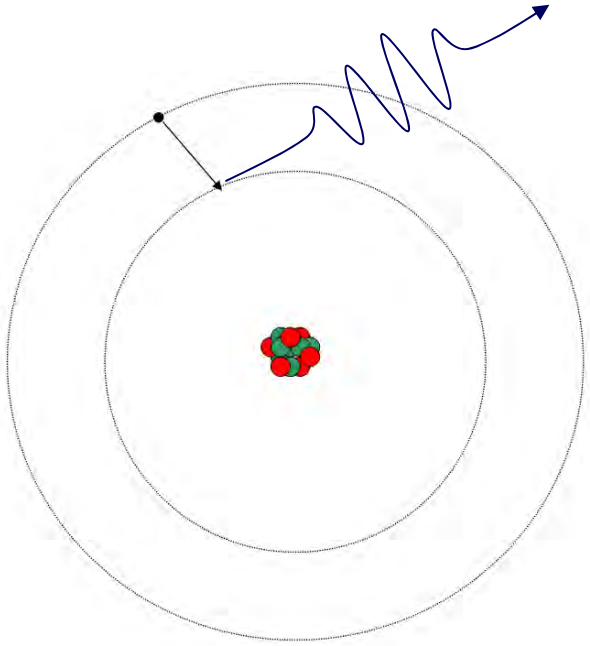
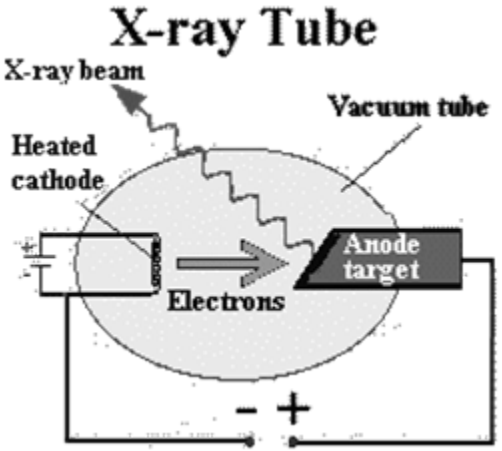
# X-ray

- Transmission
- Computed Tomography
  - Single energy
  - Dual Energy
- Backscatter
- X-Ray Diffraction



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# X-ray and Gamma Systems

Transmission
Tomography

Backscatter
Detector

Detector

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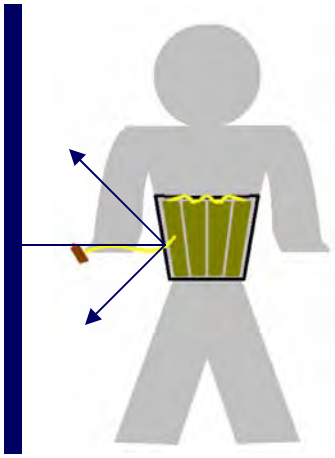
# Backscatter

- X-Ray Backscatter
  - Imaging technology
  - Penetrates clothing (added benefit in detecting contraband)
  - Relatively small dose per scan (40keV X-rays)
  - Close proximity
  - Ethical issues



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# Transmission

- Stationary source and detector array/film
- Imaging and “coloring” determine detection

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# Computed Tomography

- 3-dimensional imaging
- Single energy vs. multiple energy
  - Added energies allow for additional information to determine composition of compound.
- Usually source and detectors rotate around item under inspection

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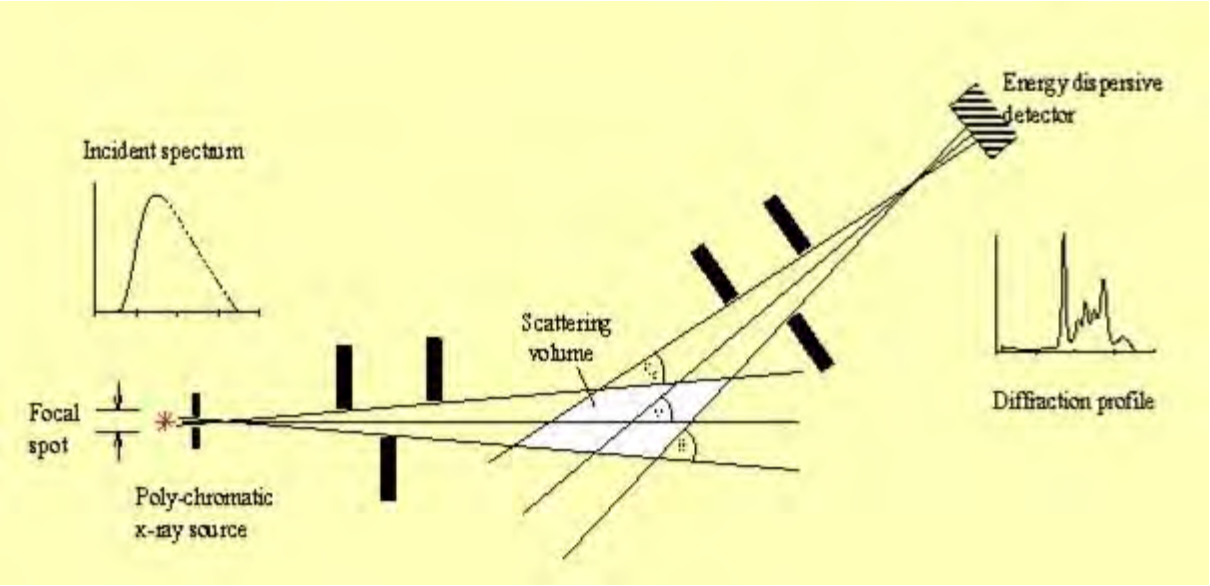
# X-Ray Diffraction

- Broad signal source
- Produces unique diffraction profile

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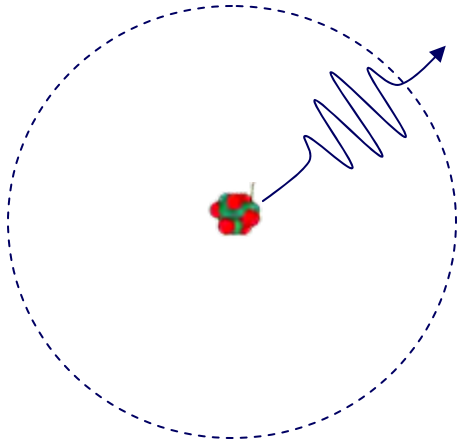
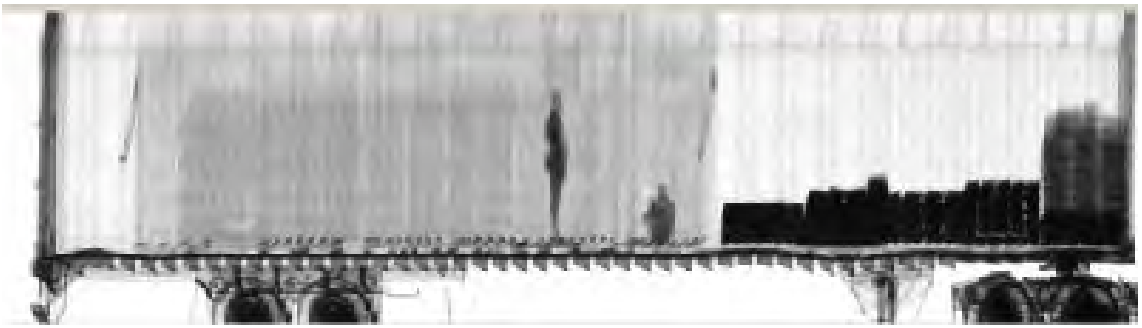
# Gamma (γ)



- Transmission & backscatter
- Radioactive source
  - Usually Cobalt 60
  - Heavily shielded
  - Exposed to image
  - Can’t turn material off and on



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# Neutron

- Neutron source to produce neutrons
  - Radioactive Source
    - Californium-252, Americium-241
  - Neutron Generators
    - Small Accelerators

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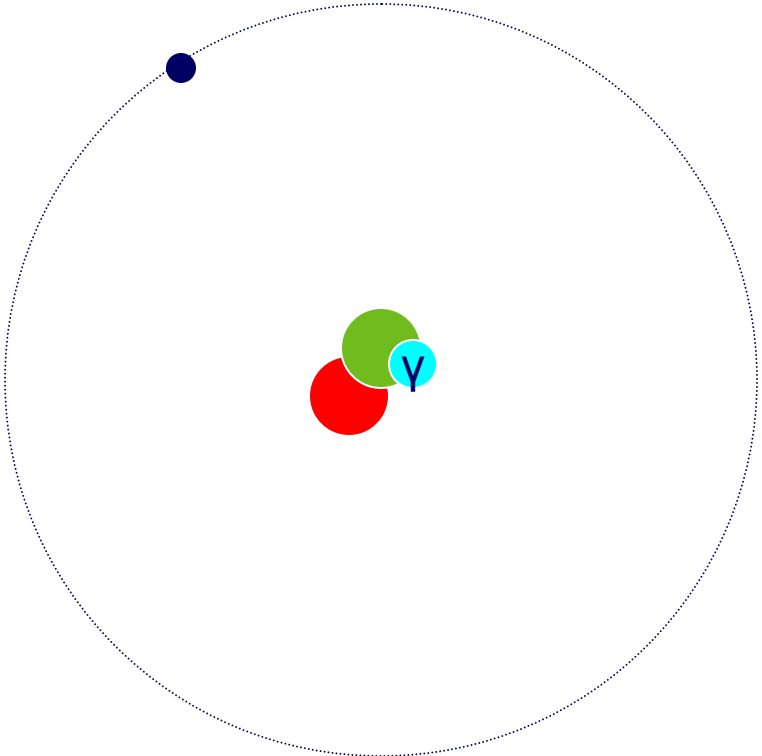
# Thermal Neutron Methods

- Determines composition of target substance
- “captures” incoming neutron and emits a specific γ
- Usually used for Nitrogen or Hydrogen signature

Neutron

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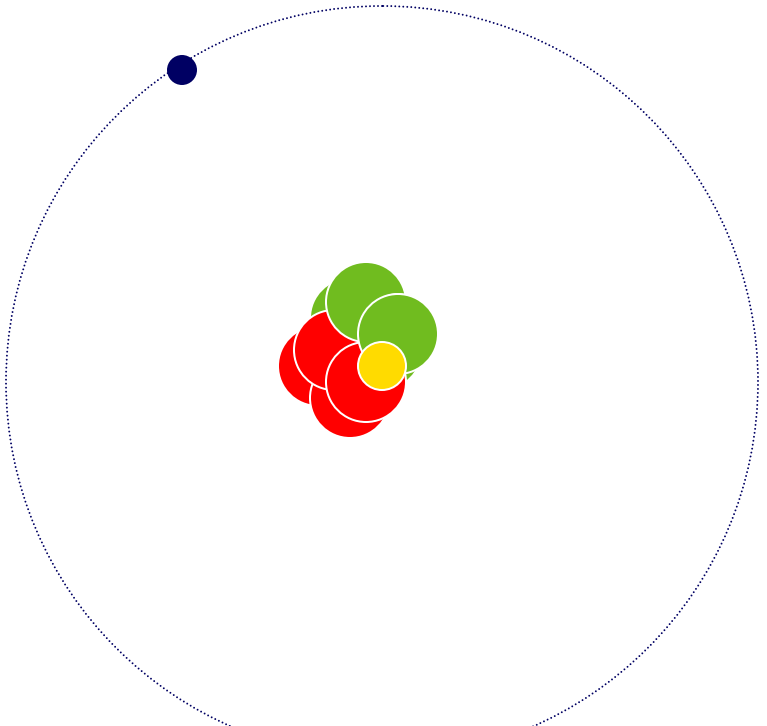
# Inelastic Scatter Methods

- Fast Neutrons “hit” nucleus and “knocks” a neutron and distinct gamma energy free.
- Pulsing fast neutrons with relatively consistent speeds, location may be identified.

Neutron



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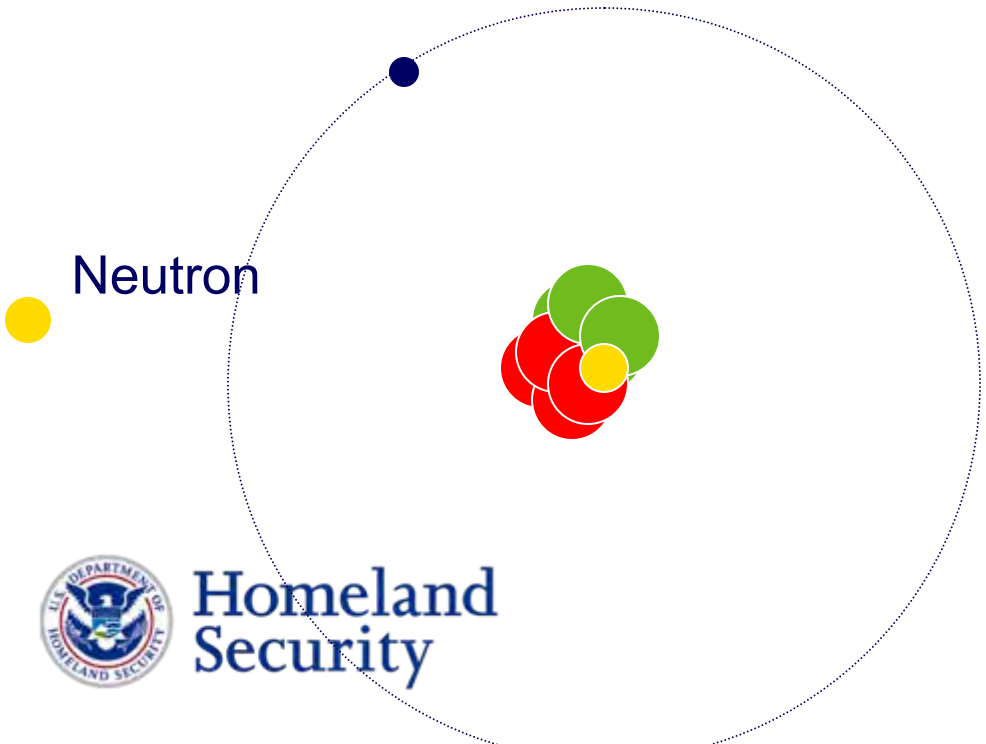
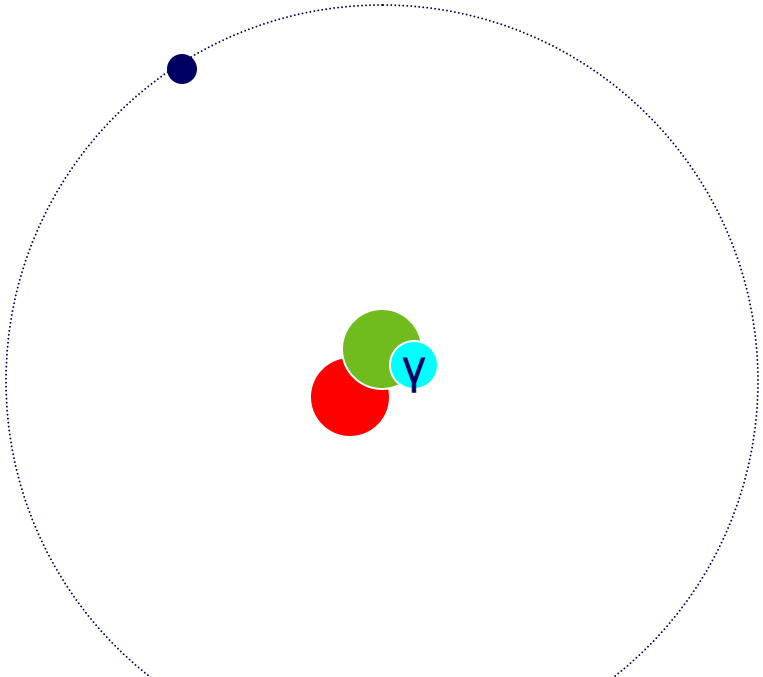
# Combination Methods

- Pulsed fast (as in inelastic scatter) then wait for the emitted neutron to thermalise as in thermal)

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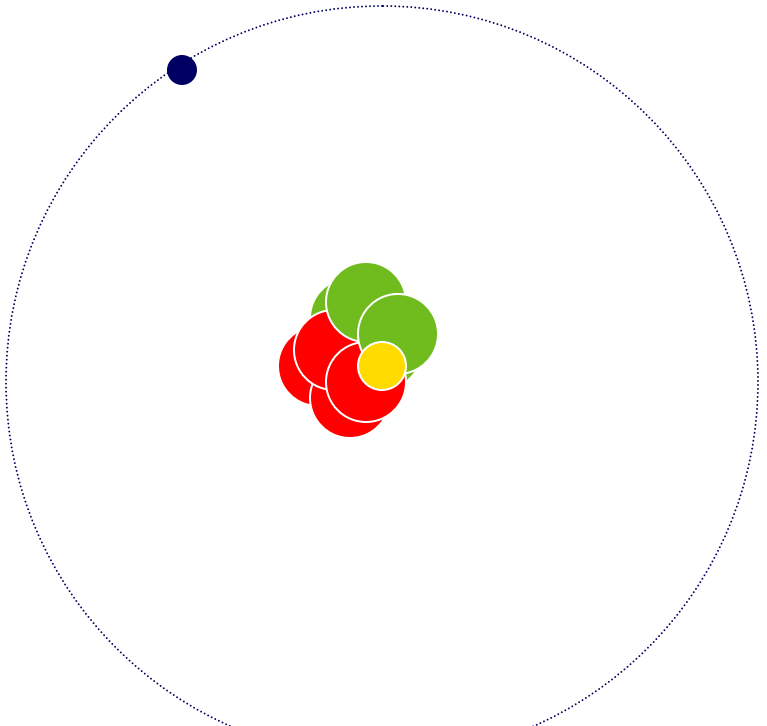
# Associated Particle

- “Tagging” neutrons by associated particles allows for locating target

Neutron

Alpha particle detector



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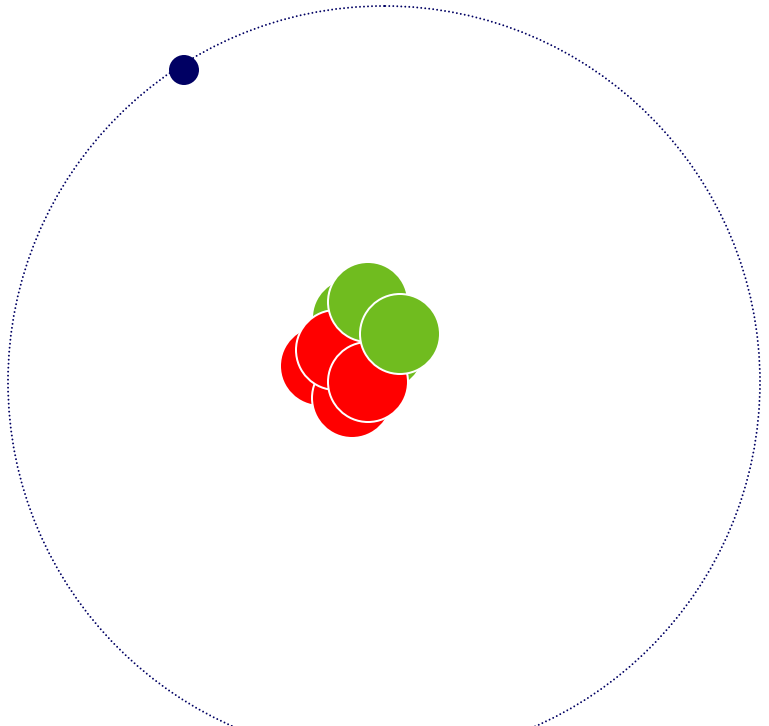
# Non-radioactive Nuclear Method

- NQR/NMR (zero field)
  - Uses Radio frequency to excite nucleus
  - As nucleus returns to lower energy state unique RF signal is emitted

Radio Frequency

•

RF Detector



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# Conclusion

- Types of Detection
- Common elements
- Detection technologies
- Conclusion

- Questions?

Homeland Security

# The National Center for Risk and Economic Analysis of Terrorism Events (CREATE)

**Detlof von Winterfeldt, Ph.D.**
Director, CREATE
Professor of Industrial and Systems Engineering, VSOE
Professor of Public Policy and Management, SPPD

**Isaac Maya, Ph.D., P.E.**
Director of Research, CREATE

University of Southern California
Los Angeles, CA

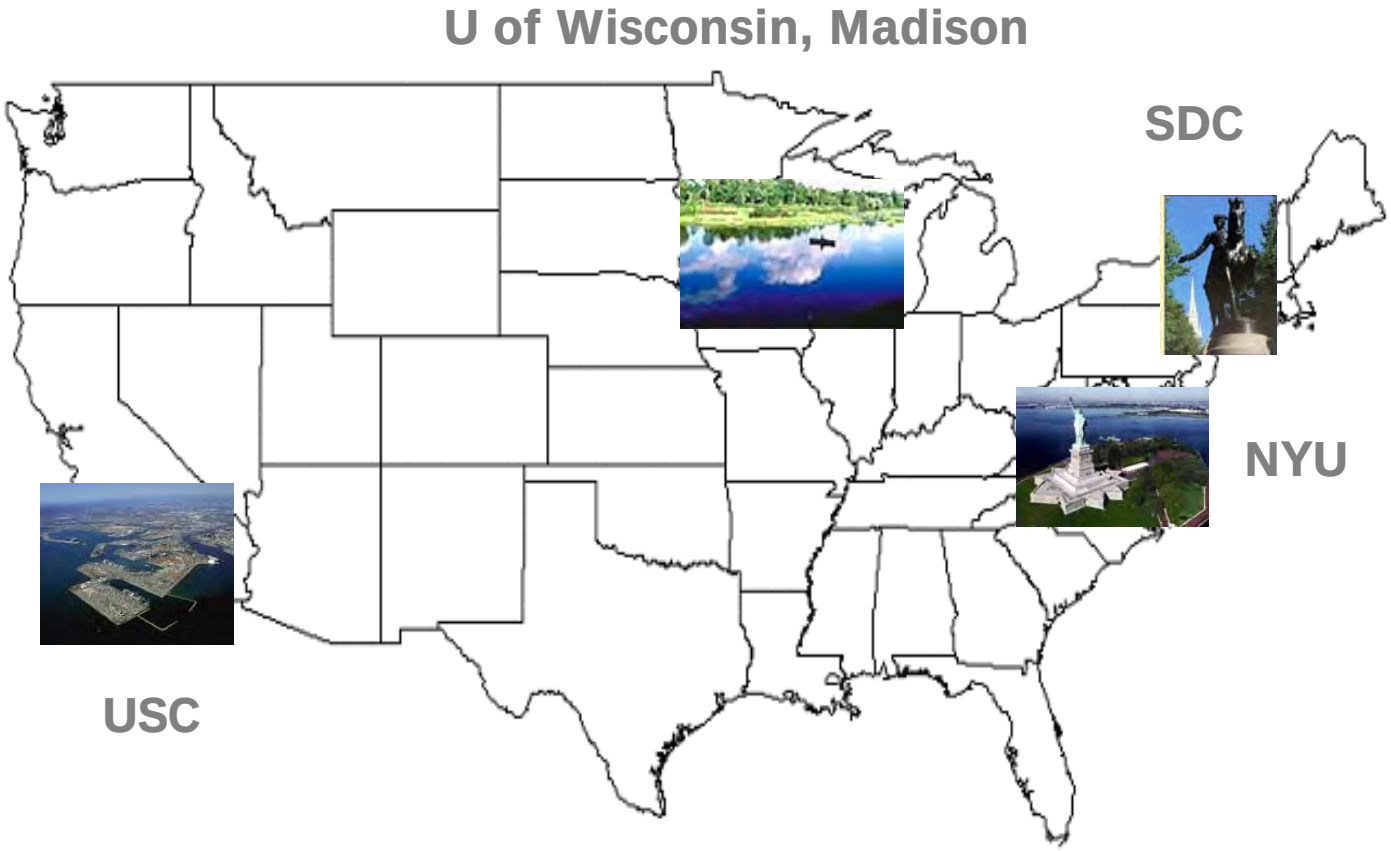
# CREATE - Background

- First DHS university center in a competition of 72 universities
- Started operations in March of 2004
- $4 million per year for three years
- Renewed for three more years
- Focus on risk and economic analysis

2004

2007

# CREATE as a National Center -- 2004



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# CREATE as a National Center -- 2007

# Why Risk Analysis?

**"….We have to ... identify and prioritize risks -- understanding the threat, the vulnerability and the consequence. And then we have to apply our resources in a cost-effective manner….. "**

# Why Risk Analysis?

- **"Risk based" prioritization of investments**
  - Requested by Secretary Chertoff
  - Requested by many in Congress
- **To quantify risks**
  - Develop threat and attack scenarios
  - Assess probabilities of attacks
  - Assess probability of success, given an attack
  - Assess consequences of successful attacks
- **To quantify risk reduction from countermeasures and allocated resources**
  - Protection
  - Prevention
  - Response and recovery

# Why Economic Analysis?

- **Our economy is a major terrorist target**
  - ***"If their economy is destroyed, they will be busy with their own affairs rather than enslaving the weak peoples. It is very important to concentrate on hitting the US economy through all possible means."***
  - ***"The young men (of the jihad) need to seek out the nodes of the American economy and strike the enemy's nodes."***

- **Small local terrorist attacks can have large national economic impacts**
- **Concern about spending too much on security – intelligent allocation of resources**

# CREATE Mission

**"Advancing risk and economic science to improve our Nation's decisions to counter terrorism"**

**To develop advanced models and tools for the evaluation of the risks, costs and consequences of terrorism and to guide economically viable investments in homeland security**

# Other Important Mission Elements – Education and Outreach

- To educate the next generation of homeland security professionals in the areas of risk and economic analysis
- To reach out to a broad constituency concerned with risks and economic consequences of terrorism

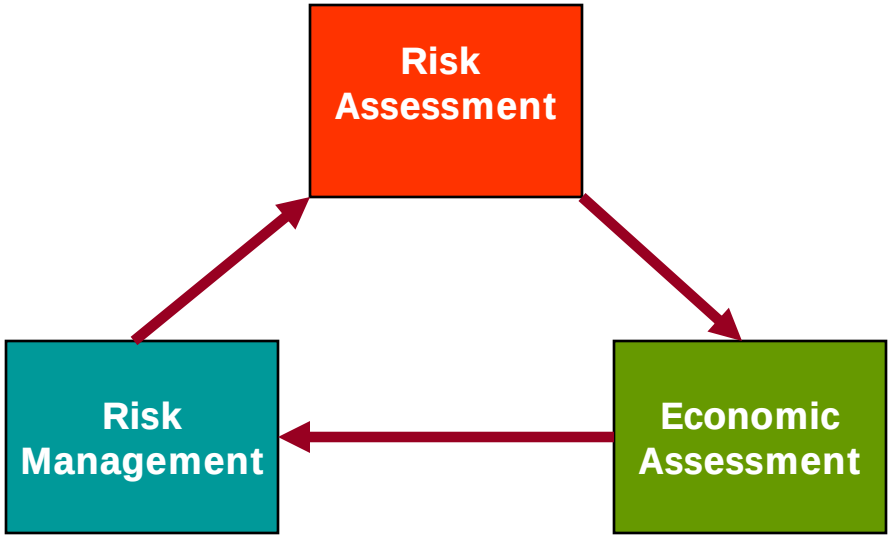
# Risk and Economic Analysis is Interdisciplinary

- **Social Science**
  - Economics
  - Psychology
  - Political Science
  - Public Policy and Planning
- **Engineering**
  - Industrial and Systems Engineering
  - Electrical Engineering
  - Civil Engineering
- **Computer Science**

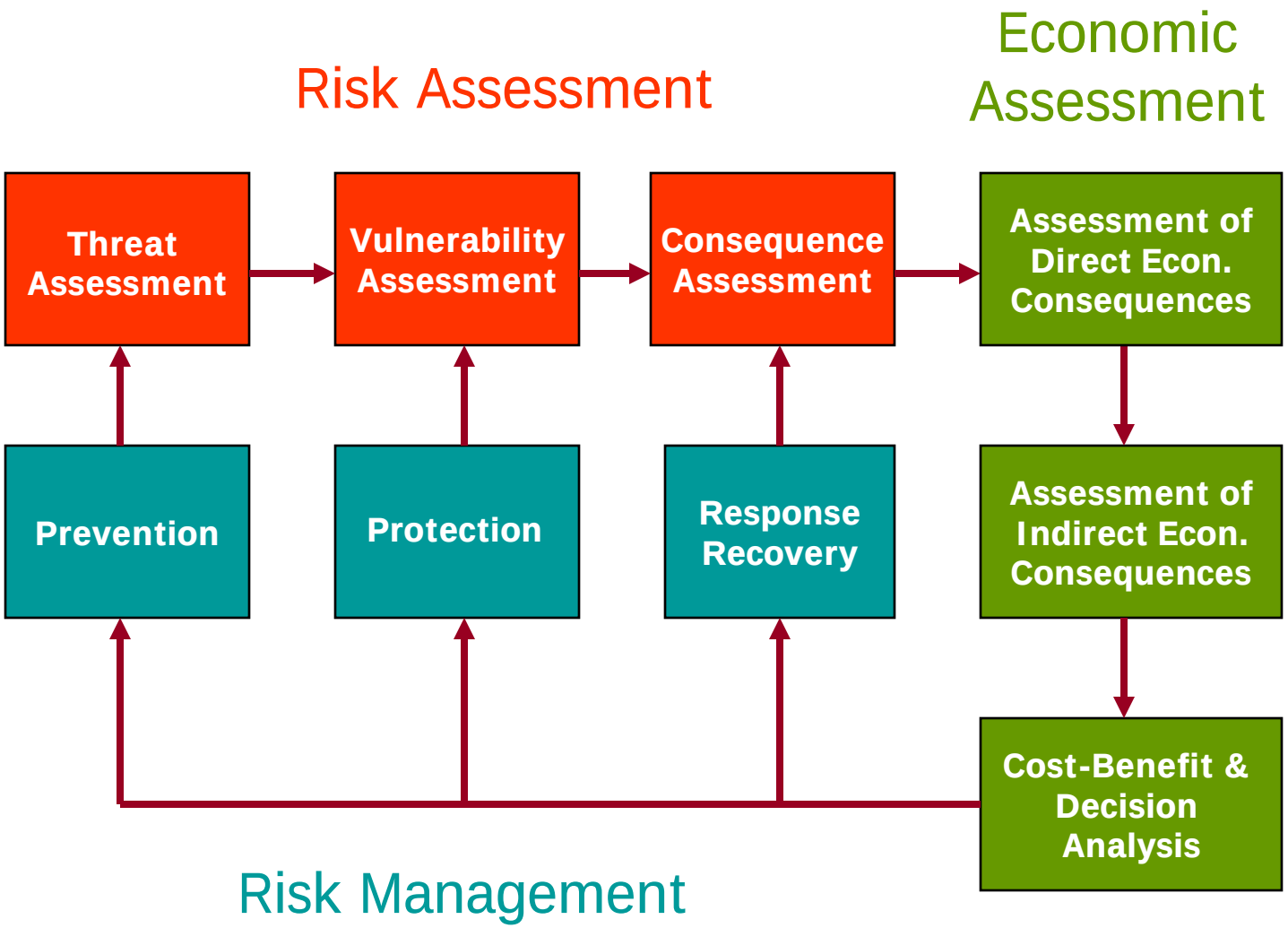
# CREATE Researchers

- **34 faculty members**
  - 23 Professors, 3 Associate Professors, 3 Assistant Professors
  - 5 adjunct, research professors, etc.
- **20 Other Researchers**
  - 4 Postdoctoral Research Associates
  - 16 research scientists, computer scientists, etc.
- **Committees and Testimony**
  - 18 major DHS related committees (NAS or similar)
  - Testimony before the House HS Committee
- **Other Quality Indicators**
  - Seven researchers with 1,000+ citations (ISI Web of Science)
  - One member of the NAS, two of the NAE

# CREATE Research Framework



# CREATE Research Framework



# CREATE Case Studies – Year 1

| | *Case Studies* | | |
|---|---|---|---|
| *Modeling and Analysis Areas* | MANPADS | Dirty Bomb | Electricity |
| Risk Assessment | | | |
| Economic Assessment | | | |
| Risk Management | | | |

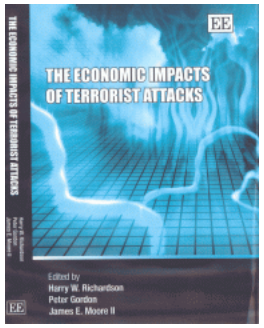
# CREATE Case Studies – Years 2-3

| | *Case Studies* | | |
|---|---|---|---|
| *Modeling and Analysis Areas* | Bioterrorism | Border Security | Risk-Based Allocation |
| Risk Assessment | | | |
| Economic Assessment | | | |
| Risk Management | | | |

# CREATE Alignment with DHS Customers

| | *DHS/S&T Divisions* | | | | | |
|---|---|---|---|---|---|---|
| ***CREATE Modeling & Analysis*** | **Explosives** | **Chem/Bio** | **Command/ Control/ Interop.** | **Borders/ Maritime** | **Human Factors** | **Infrastr./ Geophys.** |
| **Risk Assessment** | | | | | | |
| **Economic Assessment** | | | | | | |
| **Risk Management** | | | | | | |

# Examples of Center Projects and Products



## Applied Research Projects

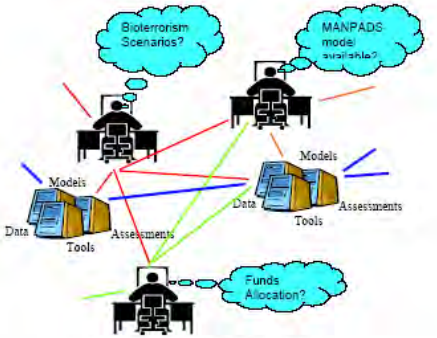
Analysis of dirty bomb attacks on ports
Analysis of terrorist attacks on electrical grid
Border security decision analysis
Economic analysis of bioterrorism events

## Fundamental Research Projects

Game theory extensions to terrorism problems
Decision analysis with adaptive responses
Probabilistic models of terrorist preferences
Network reliability and failure models

## Software Development

Risk Analysis Workbench (RAW)
MANPADS Decision Tree Software
National Interstate Economic Impact Model
Emergency response models
ARMOR



Risk Analysts' Workbench (RAW)

# Example Applications

- **Border Security**
  - System-wide study of border security
  - Immigration and Customs leadership training
- **Transportation Security**
  - MANPADS countermeasures
  - Radiological portals in sea ports
- **Infrastructure Protection**
  - Dirty bomb attacks on sea ports
  - Allocating BZPP funds in California
- **Weapons of Mass Destruction**
  - Prioritizing risks of biological attacks
  - Dirty bomb attacks on the LA/Long Beach harbors
- **Intelligence Analysis**
  - Project risk analysis of radiological attacks
  - Analysis of motivation and intent of terrorists

# Technology Transitioning

- **Tools and Models Transferred to User Communities**
- **Horizontal Network of DHS contacts to transfer knowledge through collaborations**
- **Risk Analysis Workbench**
- **ARMOR**
- **Graduating Students**

# Examples of Education Activities

- **Students, Research Assistants and Post-docs**
  - 53 students received CREATE funding
  - 35 Ph.D. students
  - Many will write Ph.D. theses on terrorism, homeland security issues
  - Six post-doctoral scholars
- **Degree Programs and Courses**
  - New Masters Degree in Systems Safety and Security
  - New Certificate in Systems Safety and Security
  - New Aviation Security program
  - Many new or modified courses
- **Visitor and Diversity Programs**
  - Seven DHS scholars
  - Four summer visiting faculty and six students from minority serving institutions
- **Internship Program**
- **FireScope**

# Programs and Courses

- New programs
  - Masters degree in Systems Safety and Security
  - Certificate degree in SSS
  - Aviation Safety and Security Program
- New Courses
  - Risk Analysis
  - Terrorism and Public Policy
  - Aviation Security
- Twelve modified courses

# Visiting Programs

- DHS Scholars and Fellows
  - Four students in 2005
  - Five students in 2006
  - Two students in 2007
- DHS minority research program
  - Three teams in 2005
  - Three teams in 2006, one at NYU
  - One of the teams is receiving continued funding from CREATE

# Emerging Themes

- **Risk assessment is difficult**
  - Too many attack scenarios
  - Adversaries seek vulnerabilities and high impact
  - Probabilities of threats and attacks shift with our action
- **Some risk assessment tasks are easier**
  - Screening can significantly reduce attack scenarios
  - Relative probabilities can be assessed
  - A terrorist attack is a multistage project – use project risk analysis
- **Indirect economic impacts are important**
  - Can overshadow direct impacts
  - Can be reduced by policy interventions
  - Can be reduced by risk communication
- **Focus on risk management helps**
  - Multiple defenses and interventions
  - Not all countermeasures are cost-effective
  - Conclusions are often robust with respect to “soft” inputs

# It Takes a Center….

- to bring multiple perspectives and scientific approaches to bear on terrorism issues
- to innovate and integrate research at the cutting edge of science
- to provide continuity in a rapidly changing environment
- to leverage resources and link homeland security to a broad network of academic and private institutions
- to be a trusted and credible source of information for the public
- to build an enduring base of knowledge and to educate the leaders for the future

# Website: www.usc.edu/create

CREATE
HOMELAND SECURITY CENTER

USC

About Create | CREATE Team | Research | Education | Advisory Committee | Partners/Affiliates | News and Events | Contact

## CREATE

**CREATE – Center for Risk and Economic Analysis of Terrorism Events – is the first university center of excellence funded by the U.S. Department of Homeland Security**

CREATE is an interdisciplinary national research center based at the University of Southern California and funded by the Department of Homeland Security. The Center is focused on risk and economic analysis of the U.S. and comprises a team of experts from across the country, including partnerships with New York University and the University of Wisconsin at Madison.

**Our Mission**

CREATE's mission is to improve our Nation's security through the development of advanced models and tools for the evaluation of the risks, costs and consequences of terrorism and to guide economically viable investments in homeland security. We will accomplish our mission through an integrated program of research, education and outreach that is designed to inform and support decisions made by elected officials and governmental employees at the national, state, and local levels. We are also working with private industry, both to improve the security of private enterprises and to work in partnership toward meeting the needs of public organizations.

The Center aims to become the world's leading academic program for modeling the risks and vulnerabilities of terrorism, assessing the direct and indirect consequences, gauging their economic impacts, and evaluating the effectiveness of countermeasures.

### Latest News

- March 16, 2006
  Disaster Response Project Appears in Local News
- February 21, 2006
  CREATE Researcher co-authors "The Political Economy of Terrorism"
- February 17, 2006
  CREATE Researcher Discusses Engineering Homeland Security Strategies on NAE Radio
- November 17, 2005
  CREATE Director Testifies Before Congress on Terrorism Risk Assessment
- July 1, 2005
  Change in CREATE Management

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For Inspiration and Recognition of Science and Technology

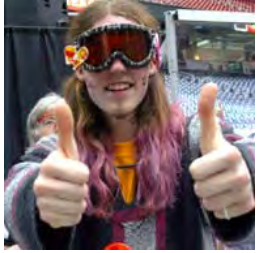
# FIRST – Industry, Government and Education Coming Together Through Robotics

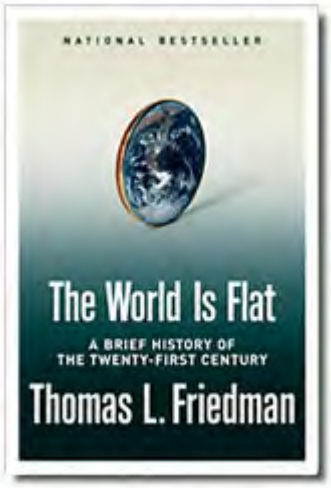
Cindy Randall
Director Research
*FIRST*
January 14, 2008

FIRST®

Rev. 6407

# Vision





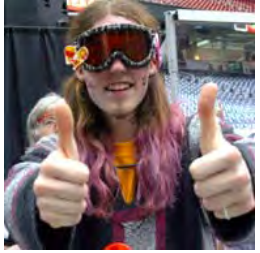

*"The American education system… just is not stimulating enough young people to want to go into science, math, and engineering." (page 270)*

*"…we have done a very poor job of conveying to kids the value of science and technology as a career choice…"*

*"…we should be embarking on an all-hands-on-deck, no-holds-barred, no-budget-too-large, crash program for science and engineering education immediately."* *(page 275)*

FIRST®

# 21st Century Workforce Specifications



## Knowledge

Math

Sciences

Psychology

History

Global Geography/Culture/Languages

## Skills

Innovation

Teamwork/Collaboration

Problem-Solving

Oral/written communications

Leadership

Lifelong Learning

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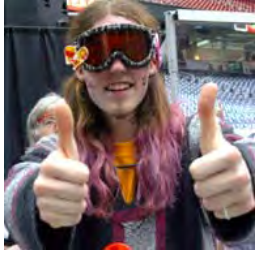
# 21st Century Workforce Specifications



## Attitude

| Old | New |
| --- | --- |
| Security | Risk-taking |
| Steady Advancement | Entrepreneurial |
| Single/Few Employers | Many Companies/Career |
| Stability | Flexibility |

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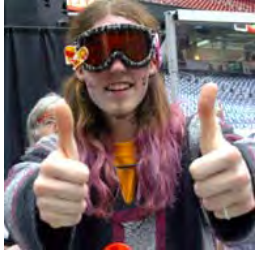
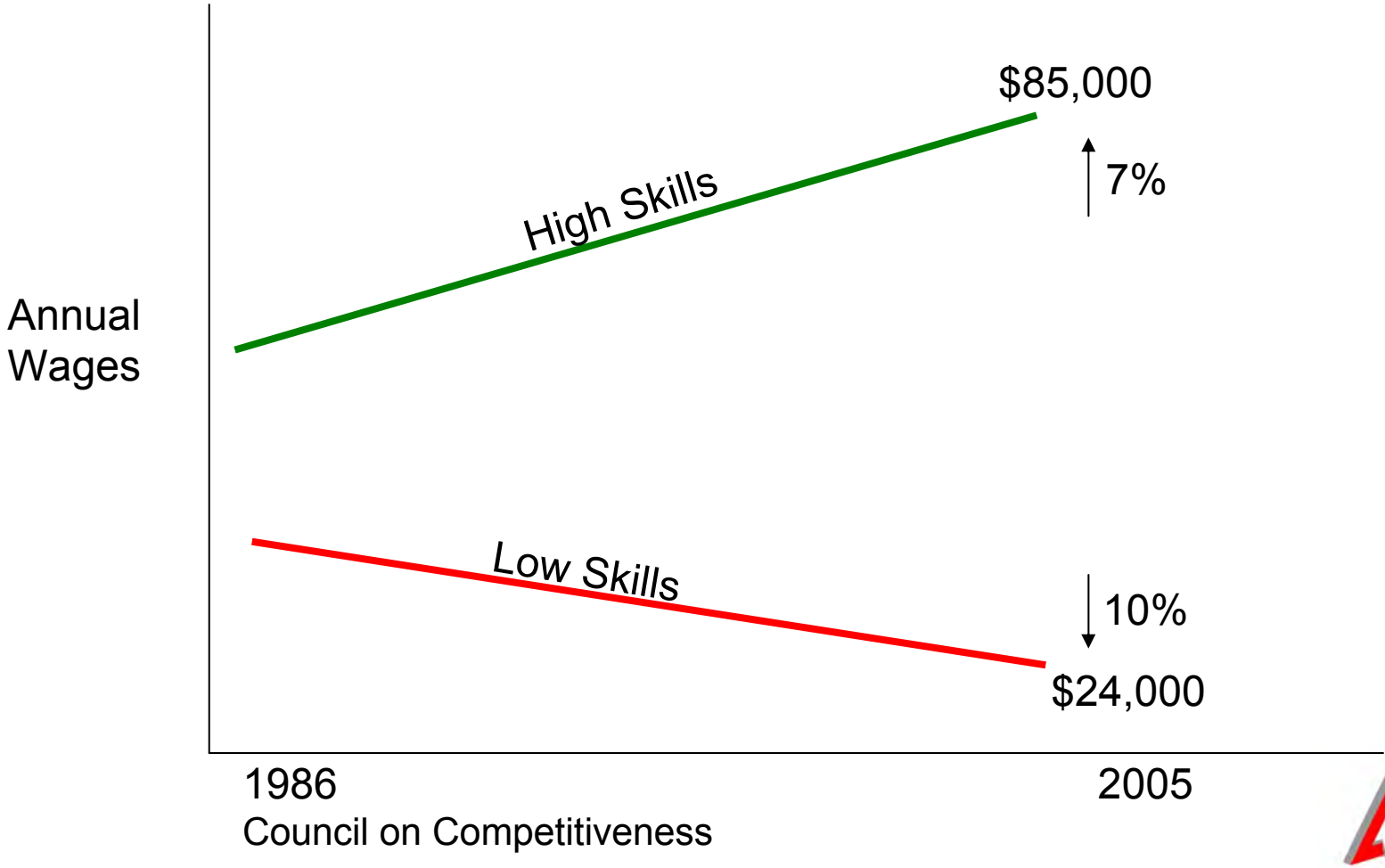
# A Growing Income Gap



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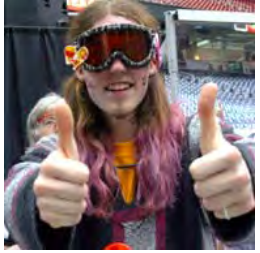
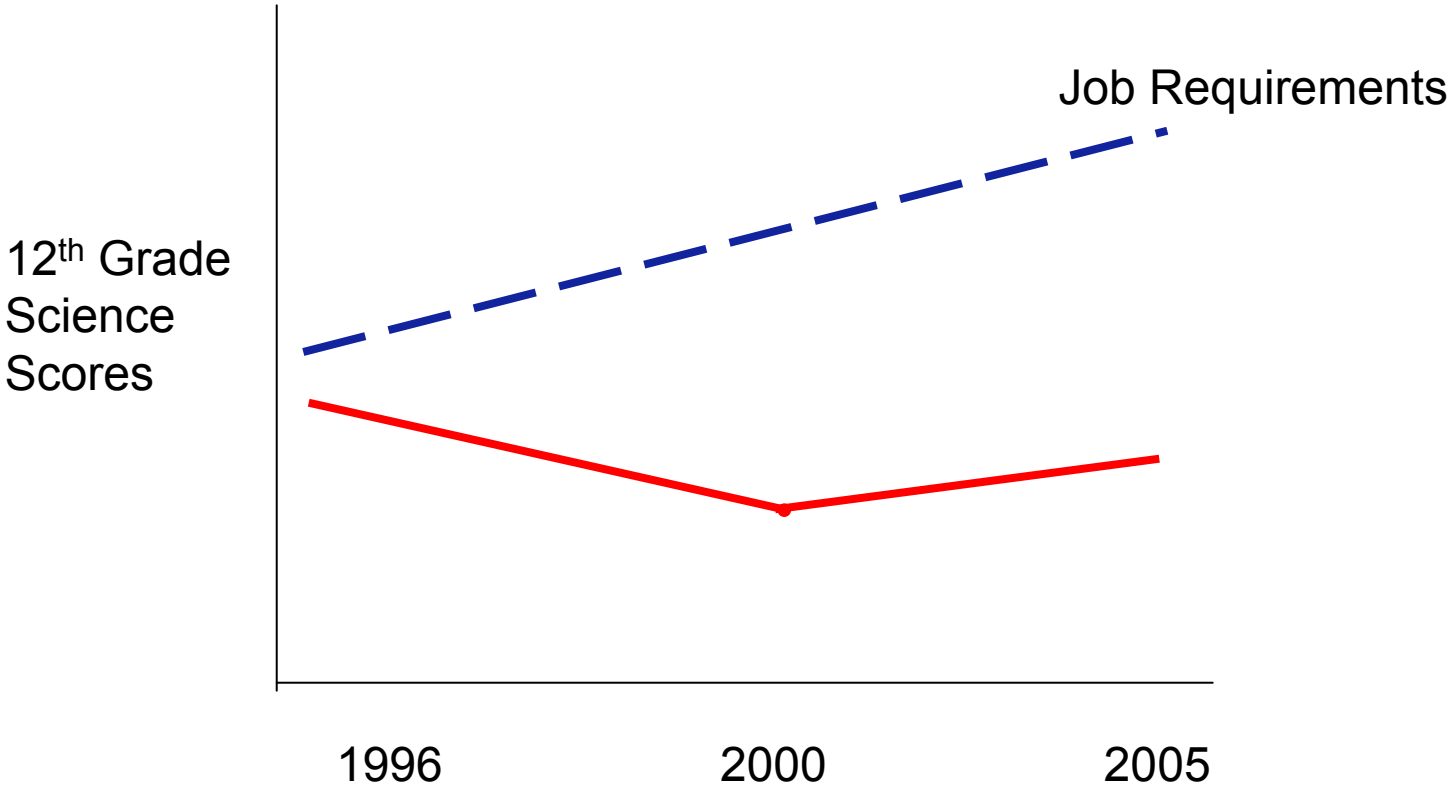
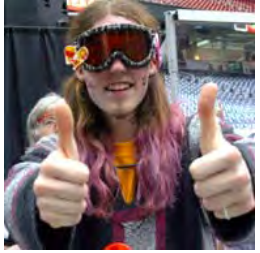
# Prepared for Future?





# Educational Initiatives



## "Supply Side"

Standards
Testing
Curriculum
Teacher Quality
Merit Pay
Teacher Training
Vouchers
Charter Schools
STEM Academies
Length of School Day / Year
New School Designs

## "Demand Creation"

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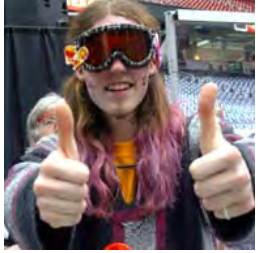
# Vision



*"…to create a world where science and technology are celebrated…*

*…where young people dream of becoming science and technology heroes…"*

Dean Kamen

Founder

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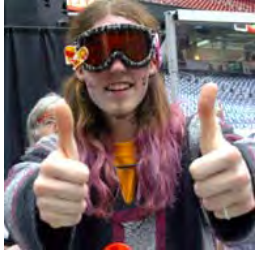
# *FIRST* Overview



- 501 (c) (3) not-for-profit organization
- Headquarters in Manchester, NH
- Board Chairman John Abele, Founder Chairman of Boston Scientific
- $25 million operating budget
- 2,000 corporate sponsors
- 60,000 volunteers
- Over 9 million in college scholarships

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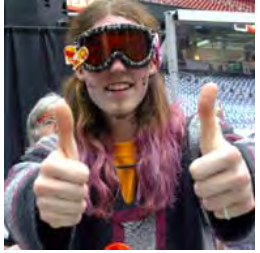
# *FIRST* Program Continuum



## "Sports Model"

"T-Ball"

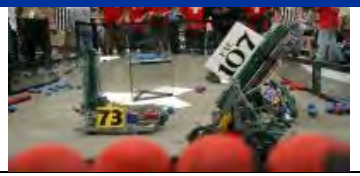
**Jr. *FIRST* LEGO League**

"Little League"

***FIRST* LEGO League**

"Junior Varsity"

***FIRST* Tech Challenge**



"Major League"

***FIRST* Robotics Competition**

K 1 2 3 4 5 6 7 8 9 10 11 12

**Grade Level**

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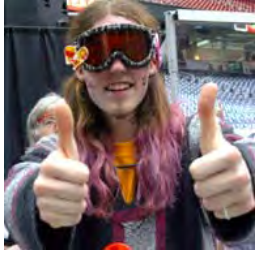
# Organization & Programs



## *FIRST* Robotics Competition: How It Works

- Combines the excitement of sport with science and technology
- Creates a unique varsity sport for the mind
- High-school-aged young people discover the value of education and careers in science, technology, and engineering
- New game each year
- Common kit of parts
- 6-week build period

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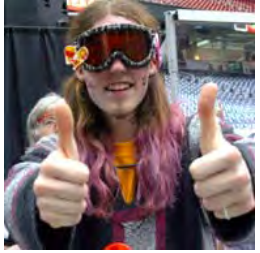
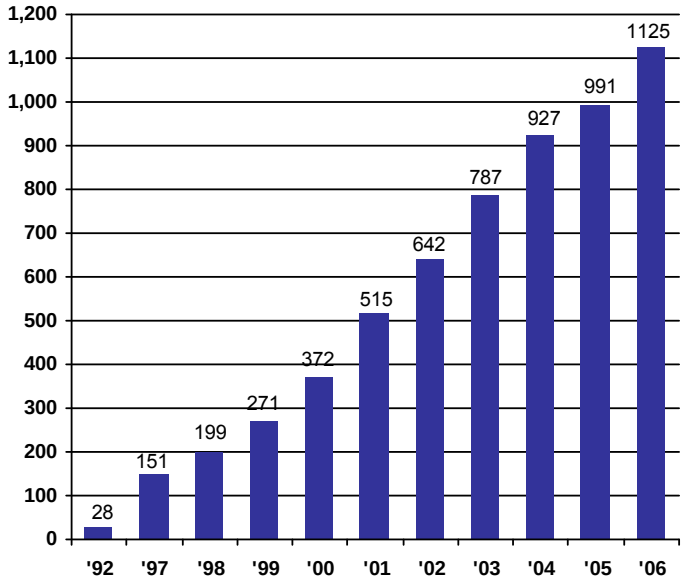
# Organization & Programs



FIRST ROBOTICS COMPETITION TEAM GROWTH




- Over 1500 teams
- 30,000 high-school-age students
- 41 regional competitions

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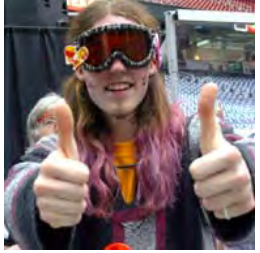
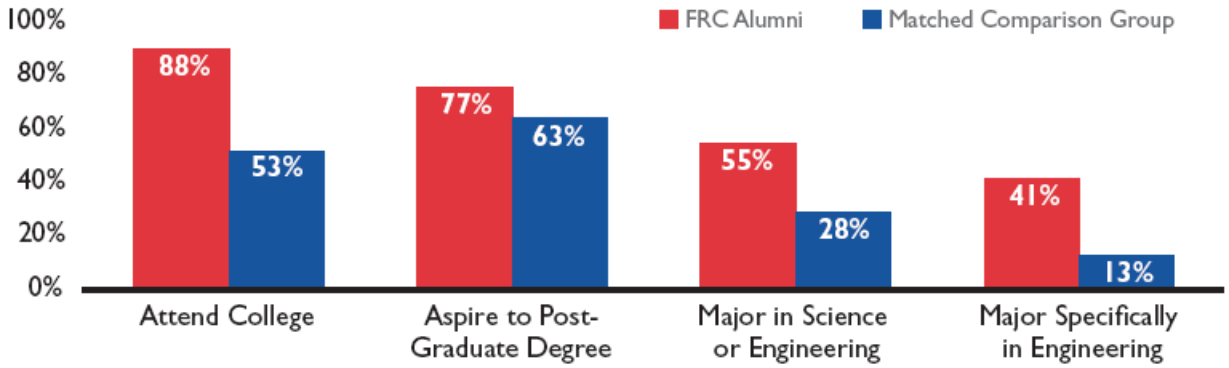
# Impact



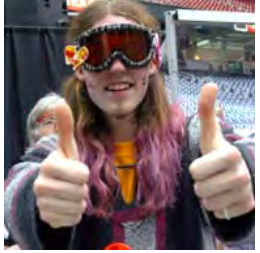
## Education in Science & Technology

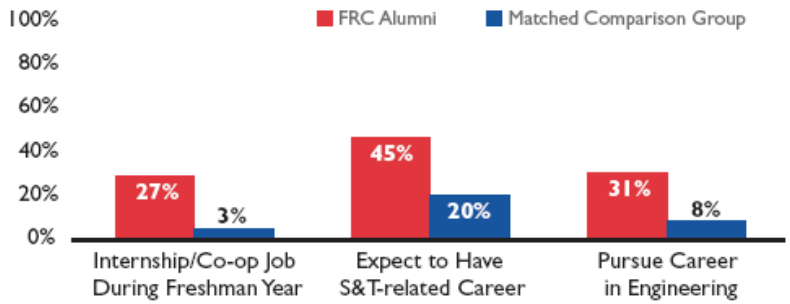
- *FIRST* Students vs. Comparison Group
- Seek Education in Science &Technology
  - Twice as likely to major in science or engineering
  - More than three times as likely to major specifically in engineering




Source: Brandeis University, Center for Youth and Communities, Heller School for Social Policy and Management

# Impact



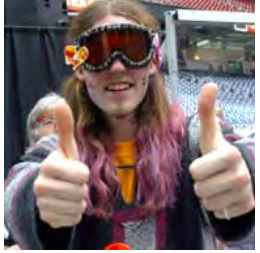



## Careers in Science & Technology

- *FIRST* Students vs. Comparison Group
- Earn Career Opportunities:
  - Almost ten times more likely to have internship
- Expect to Pursue Science & Technology Careers:
  - More than twice as likely to pursue S&T career
  - Nearly four times as likely to pursue career specifically in engineering

Source: Brandeis University, Center for Youth and Communities, Heller School for Social Policy and Management

# Organization & Programs



## *FIRST* LEGO League: How It Works

### Problem Solving and Creativity

- Present kids with a real-world problem
- Unleash thinking, energy, and fun
- 2007 Challenge: “Power Puzzle”

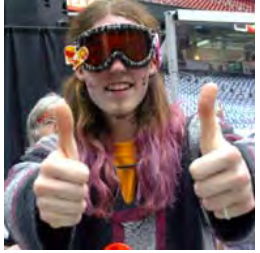
### Teams of Kids and Mentors

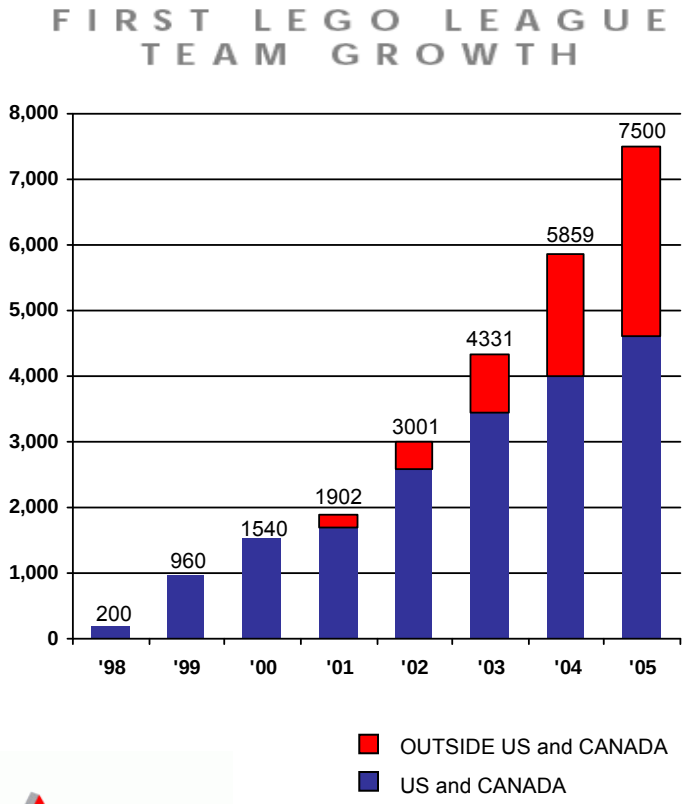
- Work as a team
- Learn with adults and mentors

### Do It All In 8 Weeks

- A Timeline to learn efficiency and effectiveness
- Compete with peers in Tournament

# Organization & Programs



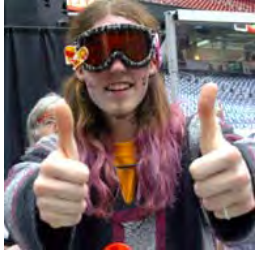



- 10,000 teams
- 100,000 middle-school-age students
- 45 countries
- 300+ qualifying events
- 68 tournaments
- Junior FLL for 6 to 9 year-olds

FLL
FIRST LEGO® League

FIRST®

# II. Organization & Programs



## *FIRST* Tech Challenge: How It Works

- Pilot program
- More accessible, affordable *FIRST* experience
- Creates bridge between FLL and FRC
- Off-the-shelf kit of parts

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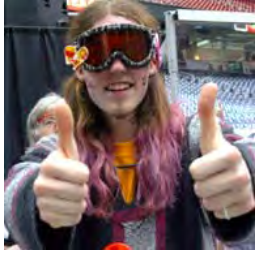
# Organization & Programs



## *FIRST* Tech Challenge

- 800 teams
- 5,000 high-school-age students
- 40 states represented
- 24 events

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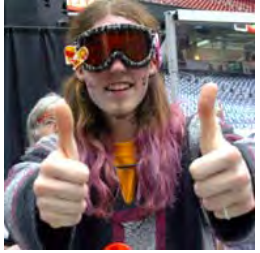
# FTC, DHS and NIST Partnership



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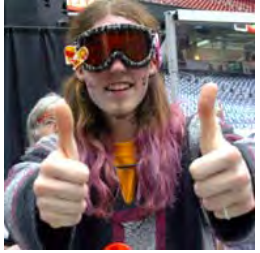
# Super Bowl Winners at the White House



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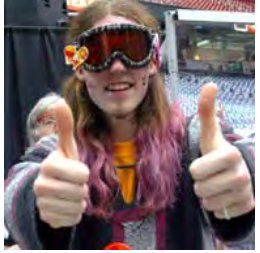
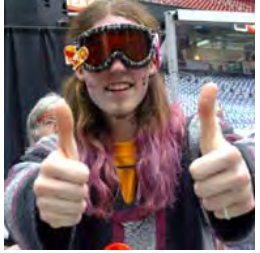
# Sponsors and Mentors



Over 2,000 leading corporations, foundations, agencies, including:

BAE SYSTEMS
GM
LEGO
hp invent
THE DOCUMENT COMPANY XEROX
Kimberly-Clark
FedEx
NASA
Google
Johnson & Johnson
Baxter
KPCB Kleiner Perkins Caufield & Byers
Coca-Cola
Boston Scientific
3M
Texas Instruments
LOCKHEED MARTIN
DEKA
Autodesk
FIRST

# Ready for a Flat World



## Knowledge

- Math ✓
- Sciences ✓
- Psychology ☐
- History ☐
- Global Geography/Culture/ Language ✓

## Skills

- Innovation ✓
- Teamwork/Collaboration ✓
- Problem-Solving ✓
- Oral/Written Communication ✓
- Leadership ✓
- Lifelong Learning ✓

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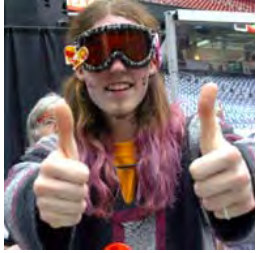
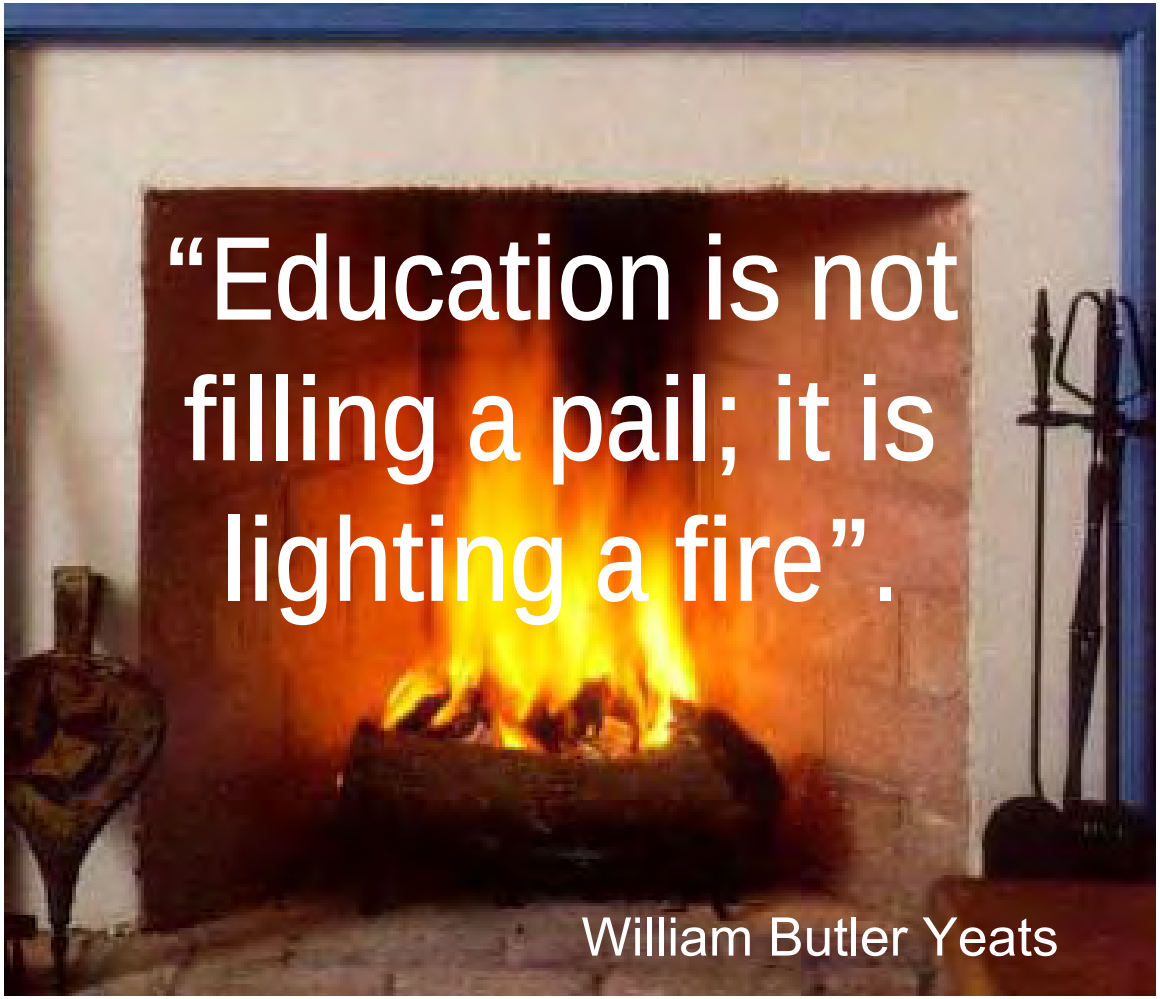
# Inspiring the Next Generation



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# RoboCupRescue Robot League

## 2007 Championship, Atlanta, Georgia, USA

RANDOM MAZE DIMENSIONS ARE 10M x 15M WITH 1.2M HALLWAYS

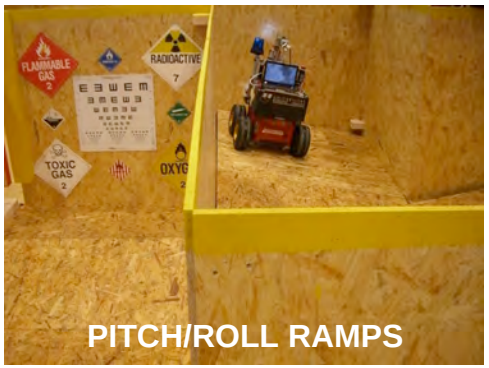
CHAIR: Adam Jacoff, National Institute of Standards and Technology, USA
rescue.robot.league@nist.gov or 301-975-4235

# RoboCupRescue Robot League
# Regional Qualifying Arena
(10M x 7.5M WITH 1.2M WIDE HALLWAYS)

## YELLOW SECTION
FLOORING: PITCH & ROLL RAMPS (10°)
OBSTACLE: RANDOM MAZE
VICTIMS: DIRECTIONAL BOXES
(SCORED BY AUTONOMOUS ROBOTS ONLY)

## ORANGE SECTION
FLOORING: PITCH & ROLL RAMPS (15°)
FLOORING: HALF CUBIC STEPFIELDS
OBSTACLE: CONFINED SPACES
VICTIMS: BOXES WITH HOLES

## RED SECTION
FLOORING: FULL CUBIC (RED) STEPFIELDS
OBSTACLE: INCLINED PLANE (45° WITH CARPET)
OBSTACLE: STEPS WITH PIPES (20CM)
OBSTACLE: STAIRS (40°, 20CM RISERS)
VICTIMS: DIRECTIONAL BOXES



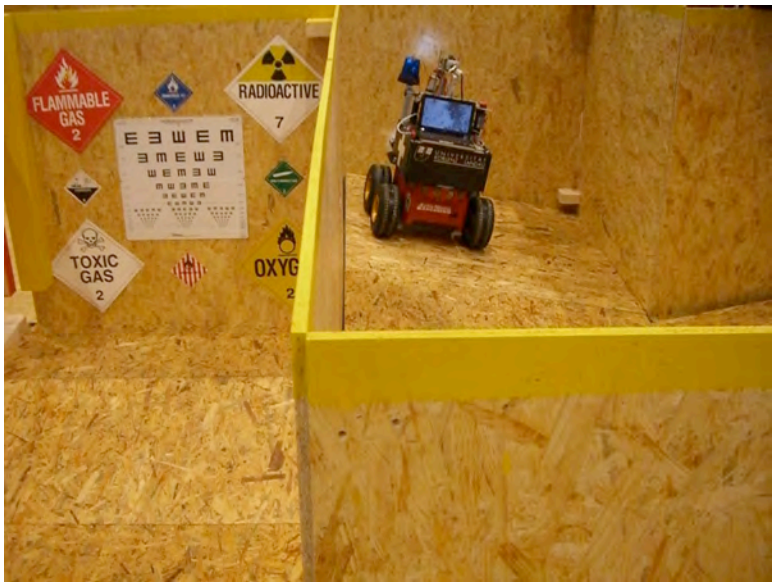
PITCH/ROLL RAMPS

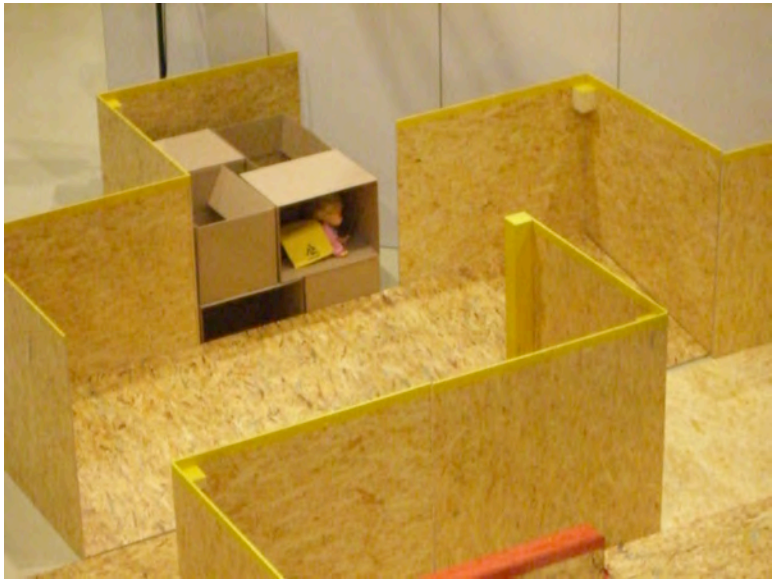
ORANGE STEPFIELDS

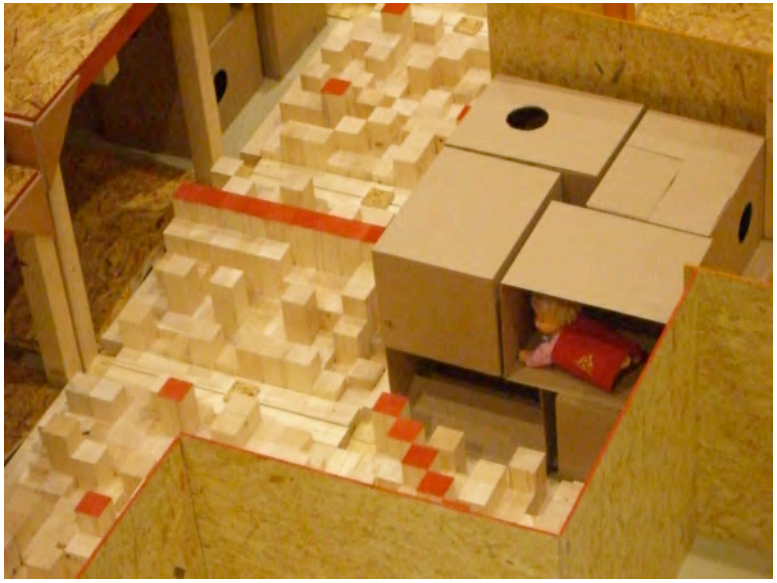
RED INCLINED PLANE

RED STEPFIELDS

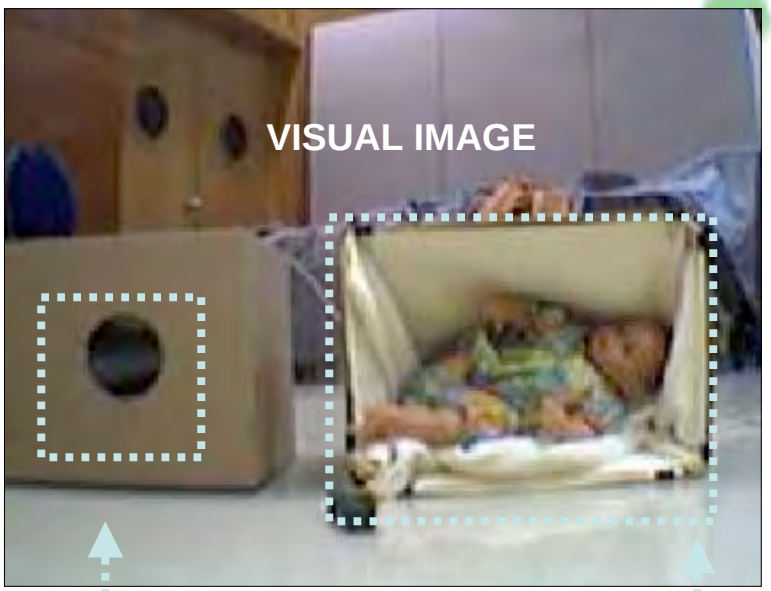
# RoboCupRescue Robot League
# Regional Qualifying Arena



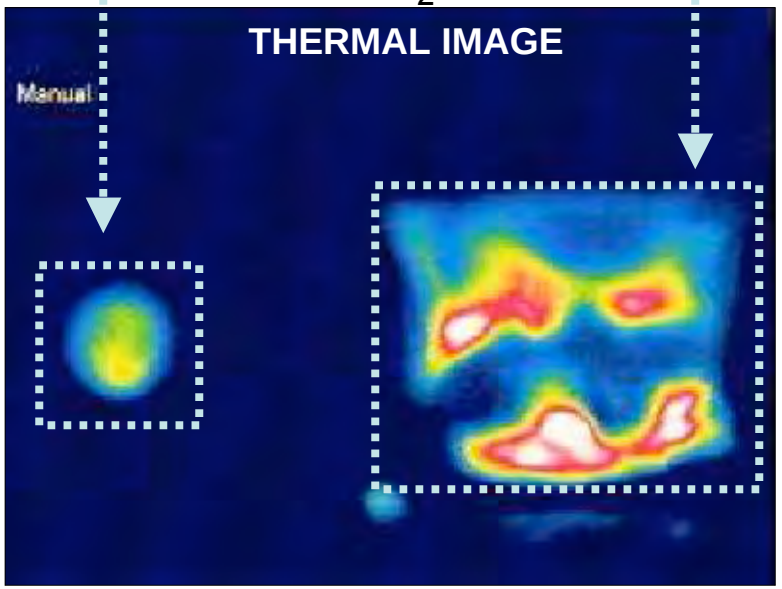




# RoboCupRescue Robot League
# Simulated Victims




Signs of life: form, motion, heat, sound, $CO_2$



# RoboCupRescue Robot League
# Arena Elements

*Arena Elements Are Emerging*

**Standard Test Methods For**

**Urban Search & Rescue Robots**

*through*

**ASTM International**

(Working Group E54.08)

RANDOM MAZES WITH DEAD ENDS

NON FLAT FLOORING THROUGHOUT

REMOTE OPERATOR STATION

VIDEO AND TRACKING DISPLAYS

# RoboCupRescue Robot League
# Rules at a Glance

## New For 2007:

- Victim placements will be known to the operators and audience prior to missions, and changed each round to ensure complete arena coverage over multiple missions.
- Resets allow fixing/replacing the robot at the start point but loss of accumulated victims, maps, and time.
- GeoTIFF map formats will be used to allow comparison of maps to ground truth arena configurations.
- Best-In-Class awards for autonomy and mobility will be given to robots that find the most victims in the Yellow and Red arenas respectively over all missions.

## Arena Features: Yellow, Orange, Red

- Random mazes with non-flat flooring
- Stepfield pallets (Orange: half-cubic, Red: full-cubic)
- Stairs (40°, 20cm riser, 25cm tread depth)
- Ramp (45° to test torque and center of gravity)
- Confined spaces (ceiling blocks under elevated floors)
- Visual acuity (tumbling E eye charts, hazmat labels)
- Directed perception boxes with victims/targets inside

## Simulated Victims: 4 per arena, 12 total

- The chair will place victims in two high and two low boxes per arena, in different locations each round.
- Signs of life: form, heat, motion, sound, and/or CO2
- “Trapped” are in boxes open on top
- “Void” are in boxes open to side
- “Entombed” are in boxes with view holes
- Tumbling E’s and/or hazmat labels are victim tags

## Missions:

- Teams queue at paddock entry prior to scheduled start.
- 15/20/25 minute missions include robot placement at the start point and operator station setup. Each team is responsible for making sure victims are functional (heat, batteries, tags) prior to their mission start.
- Teams are allowed one operator during missions.
- Start points will be in the Yellow arena with all robots facing the same direction (“north” on your map).
- Yellow arena victims can be scored only by robots with autonomous navigation and victim identification. Operators may take over control at any time to move into the Orange and Red arenas but must return to the start point to resume autonomous searches.
- Teleoperative robots can only score Orange or Red arena victims, which are placed on both sides of the Yellow arena to encourage complete mapping.
- Resets allow fixing/replacing the robot at the start point but loss of accumulated victims, maps, and time.
- Bumping penalties are assessed if the administrator must replace/fix arena elements prior to next mission.
- GeoTiff map formats get full scores for map quality and will be compared to ground truth for accuracy.
- Highest cumulative scores from 7-10 missions will be awarded 1st, 2nd, 3rd place awards.
- Best-In-Class awards will be given to **individual robots** that do the following during all missions:
  - Autonomy: Find the most Yellow arena victims
  - Mobility: Find the most Red arena victims

# RoboCupRescue Robot League
# Awardees

17 of 20 participating teams performed missions representing AUS, DEU, IRN, JPN, MEX, SWE, THA, USA.

## *CHAMPIONSHIP AWARDS: MIXED INITIATIVE MISSIONS*

*Teams with the highest cumulative scores from 7-10 missions receive 1st, 2nd, 3rd place awards*

1st: INDEPENDENT, KING MONGKUT'S INST. OF TECH. BANGKOK, THAILAND

2nd: PELICAN UNITED, CHIBA INSTITUTE OF TECH. & TOHOKU UNIV., JAPAN

3rd: CEO MISSION, UNIV. OF THE THAI CHAMBER OF COMMERCE, THAILAND

## *BEST-IN-CLASS: MOBILITY*

*Robots that found the most Red Arena victims throughout and scored the most points in mobility missions*

1st: PELICAN UNITED, CHIBA INSTITUTE OF TECHNOLOGY, JAPAN

2nd: SHINOBI, THE UNIVERSITY OF ELECTRO-COMMUNICATIONS SGI, JAPAN

3rd: INDEPENDENT, KING MONGKUT'S INST. OF TECH. BANGKOK, THAILAND

## *BEST-IN-CLASS: AUTONOMY*

*Robots that found the most Yellow Arena victims throughout and scored the most points in mapping missions*

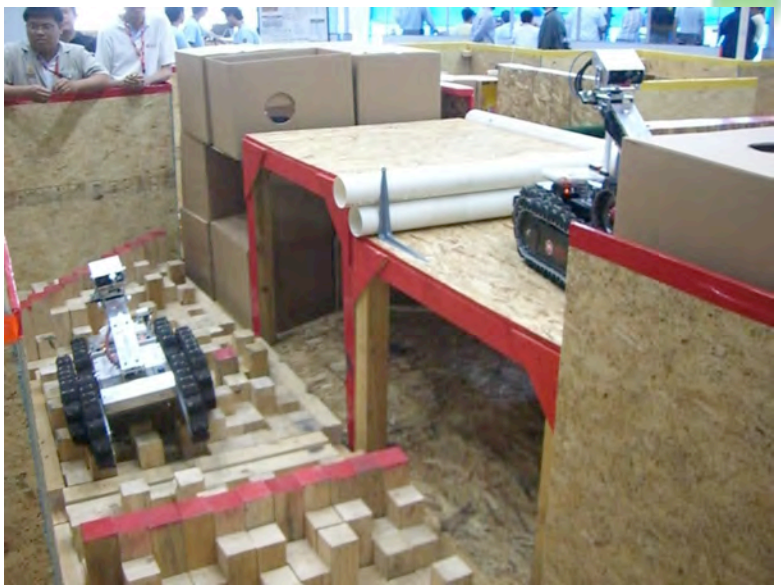
1st: RESKO, UNIVERSITAT KOBLENZ UND LANDAU, GERMANY

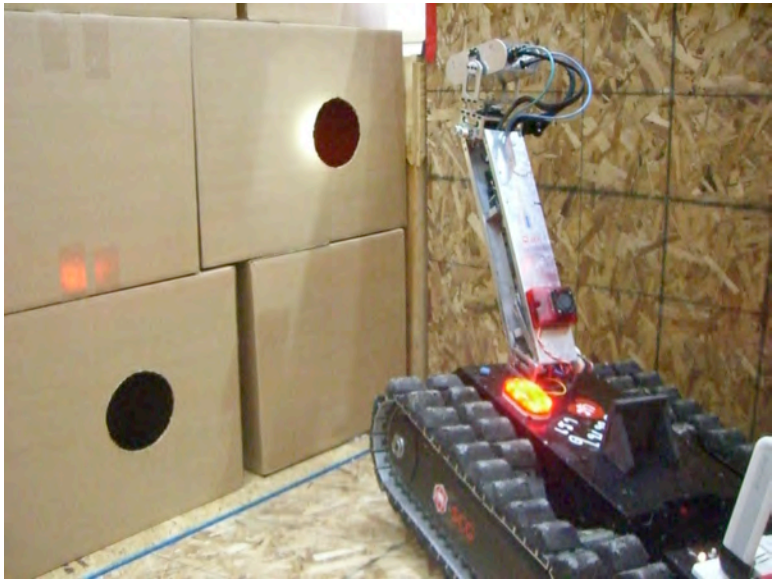
2nd: JACOBS RESCUE ROBOT, JACOBS UNIVERSITY BREMEN, GERMANY

3rd: RFC UPPSALA, UPPSALA UNIVERSITY, SWEDEN

# Independent, KMITNB, Thailand

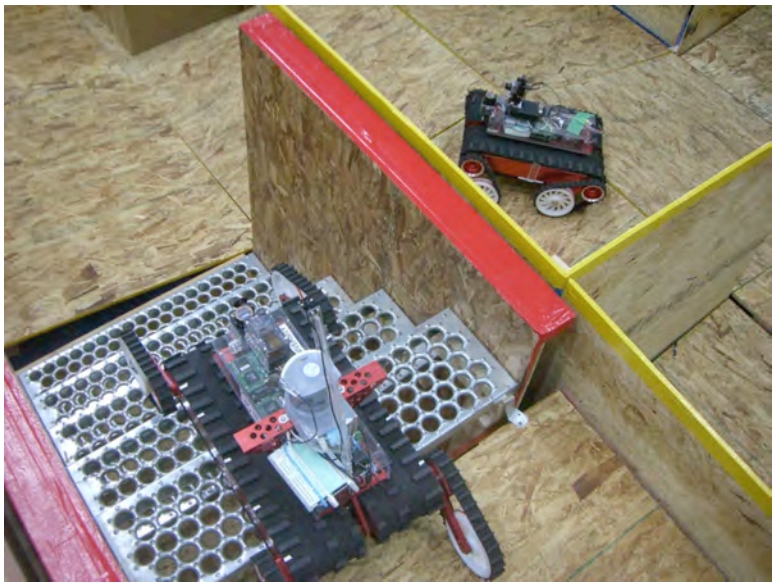
## *1st Place Award & 3rd Best-in-Class Mobility*

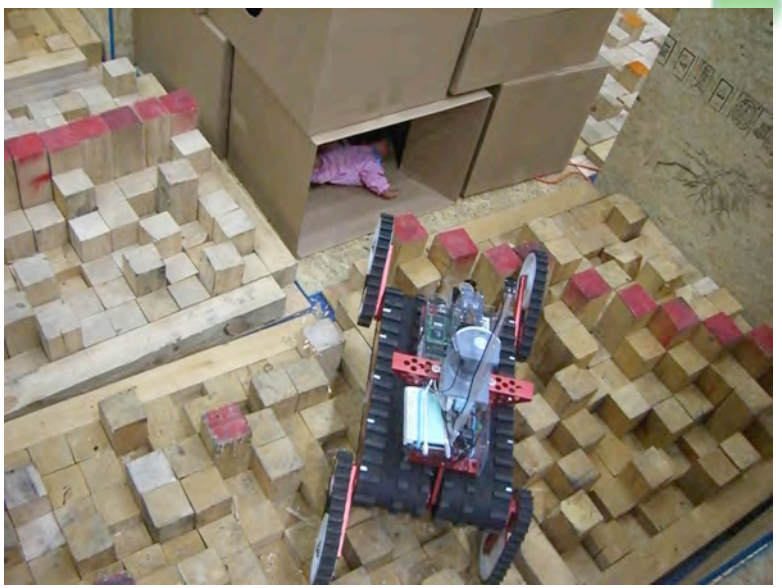


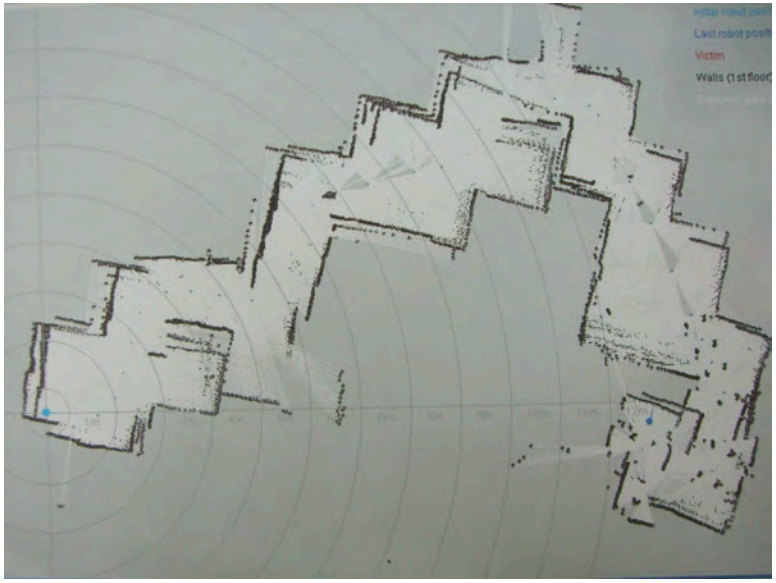


# Pelican United, Chiba Inst and Tohoku Univ, Japan

## *2nd Place Award & 1st Best-in-Class Mobility*

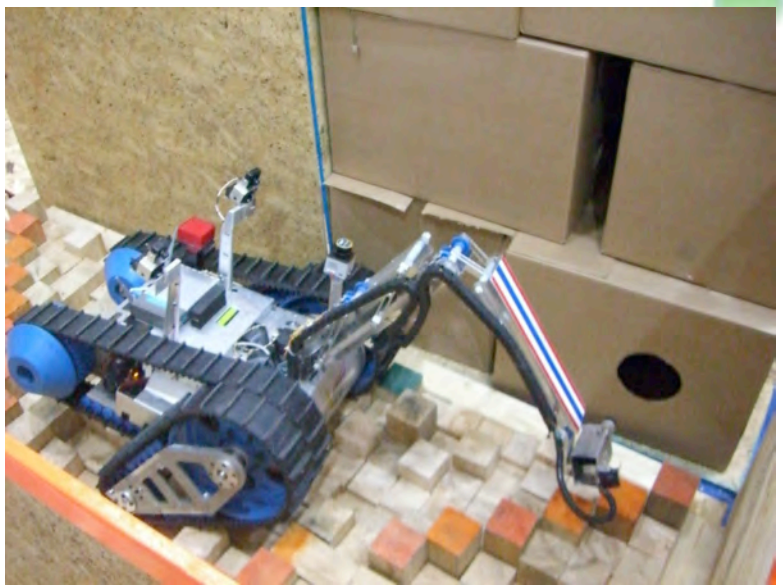


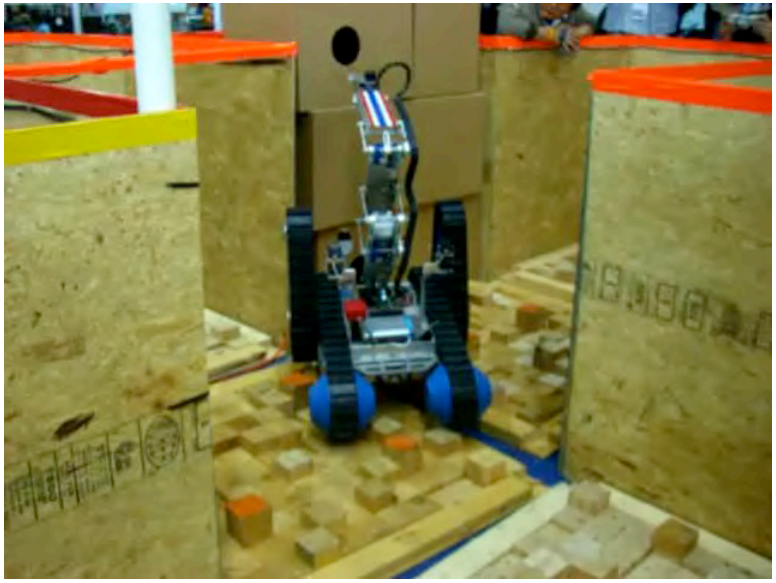




# CEO Mission, Univ Thai Chamber of Commerce, Thailand

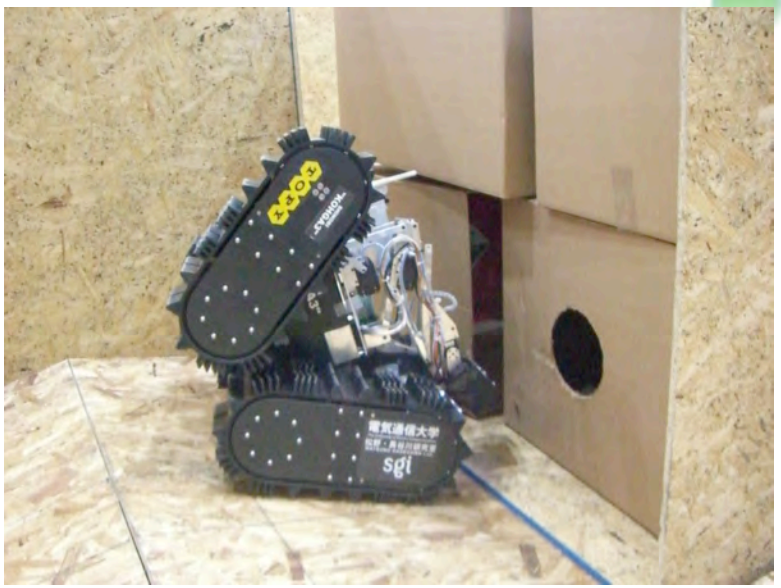
## *3rd Place Award*

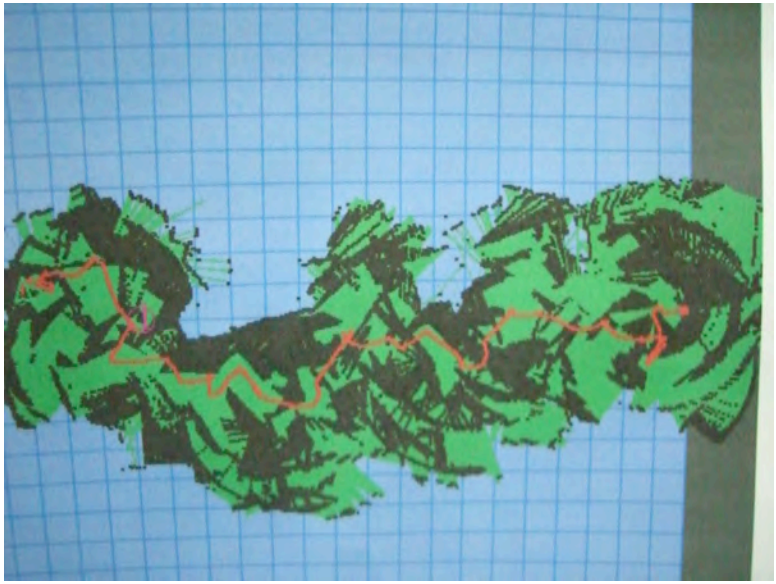


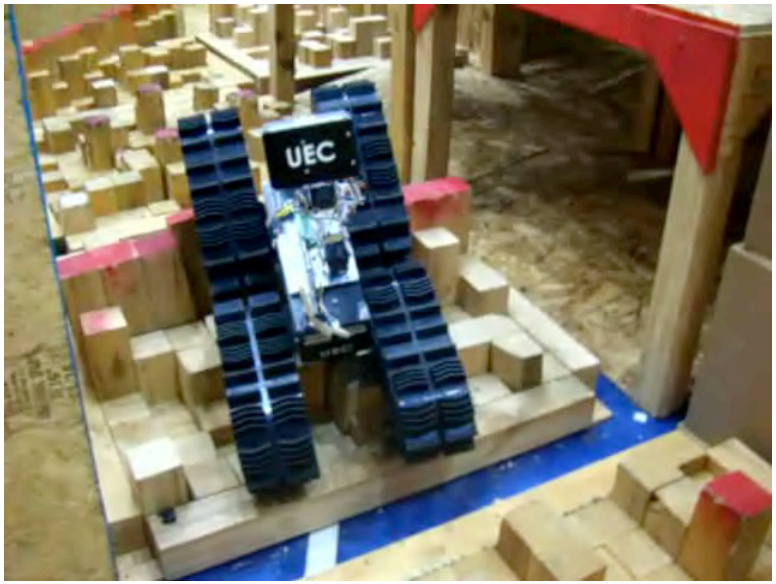


# Shinobi, Univ of Electro-Communications, Japan

## *2nd Best-in-Class Mobility*

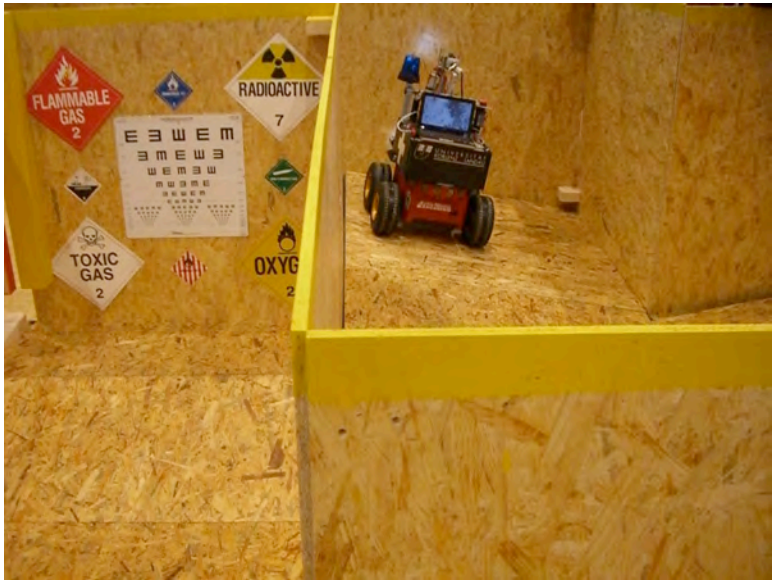


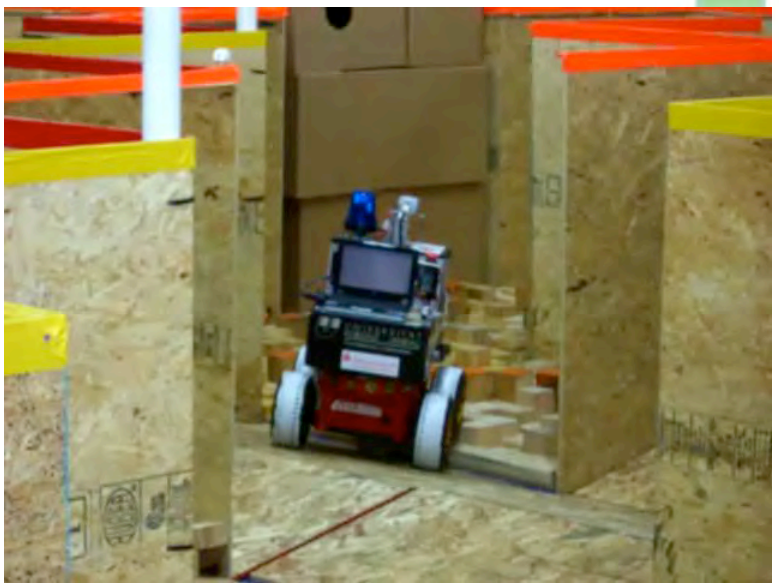





# RESKO, Univ of Koblenz and Landau, Germany

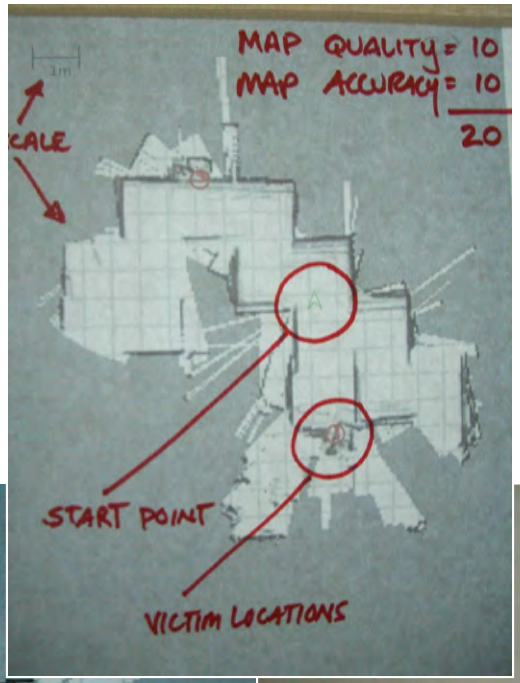
## *1st Best-in-Class Autonomy/Mapping*

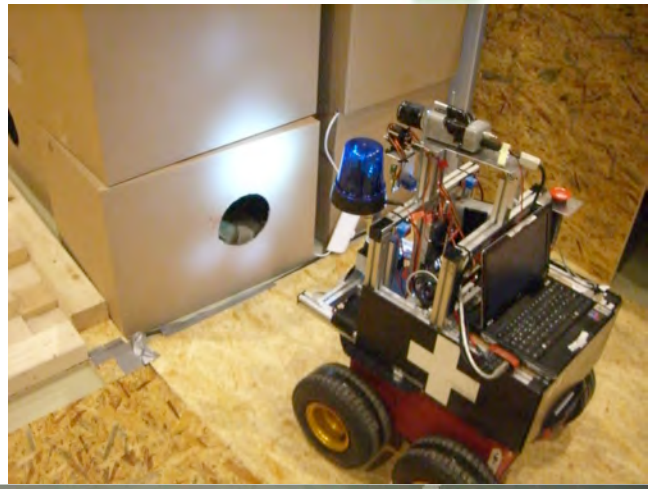


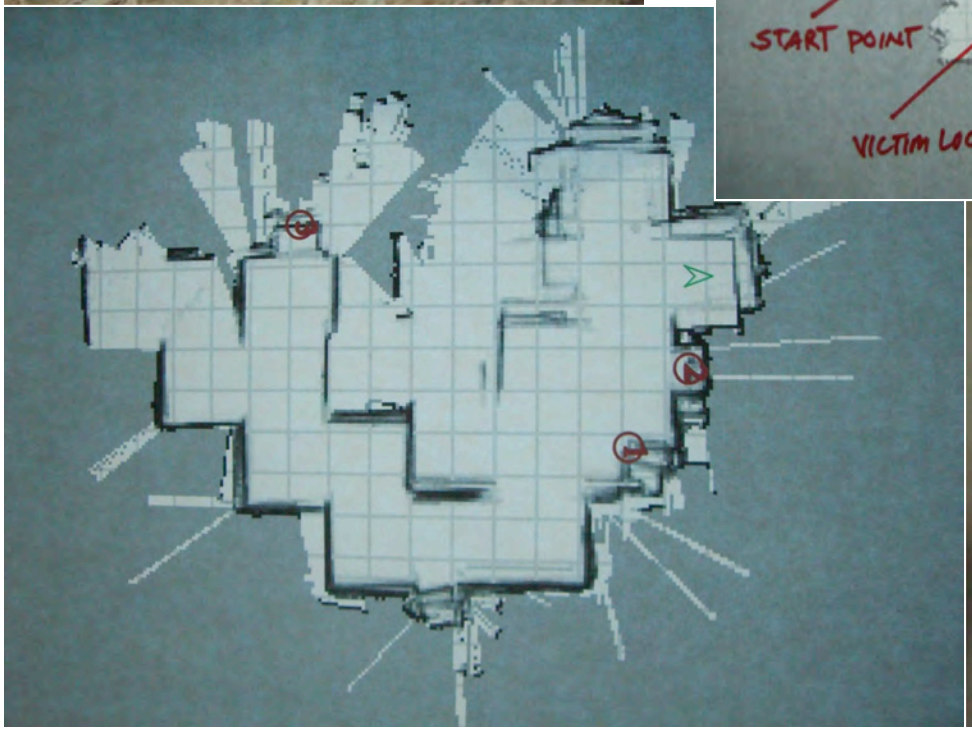



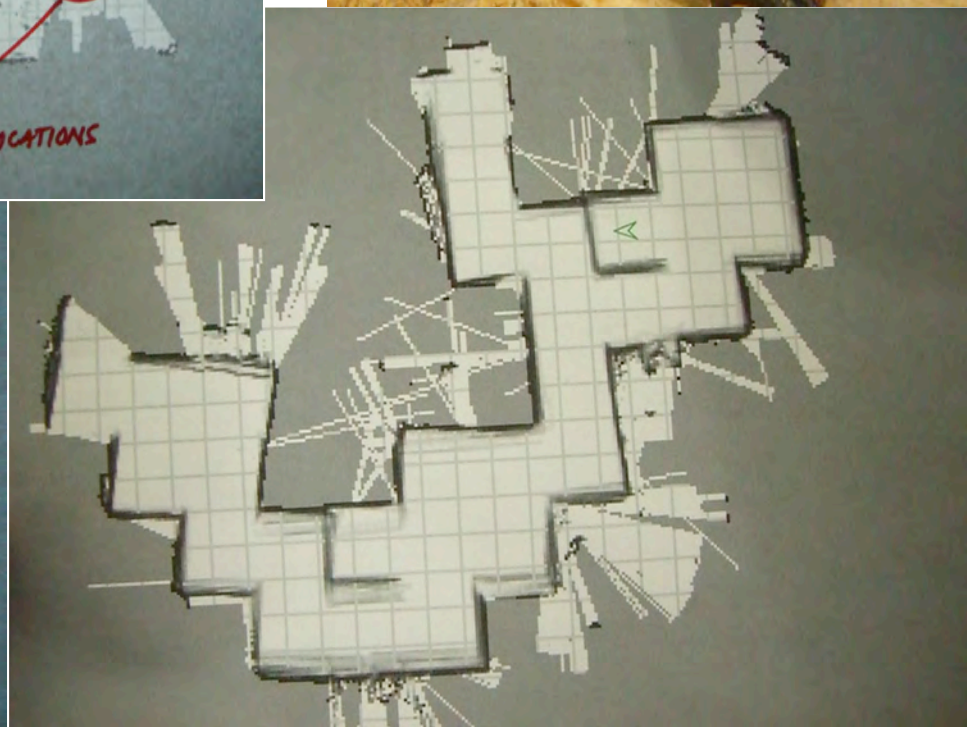
# RESKO, Univ of Koblenz and Landau, Germany

## *1st Best-in-Class Autonomy/Mapping*



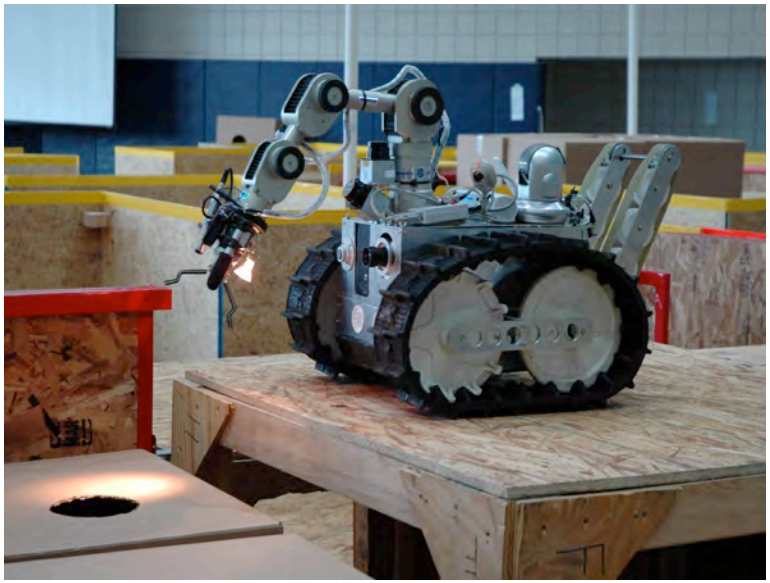







# Jacobs Rescue Robot, Jacobs Univ Bremen, Germany

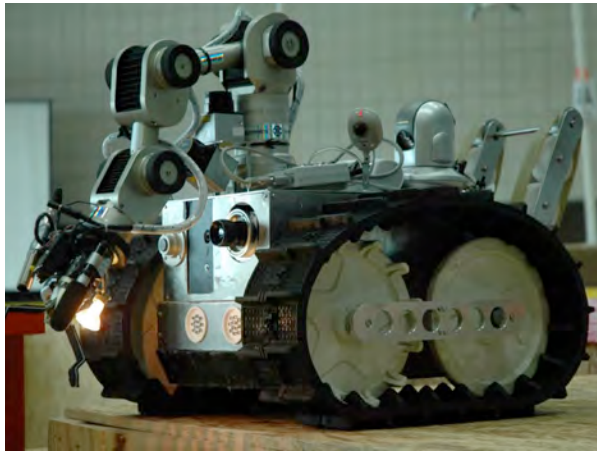
## *2nd Best-in-Class Autonomy/Mapping*

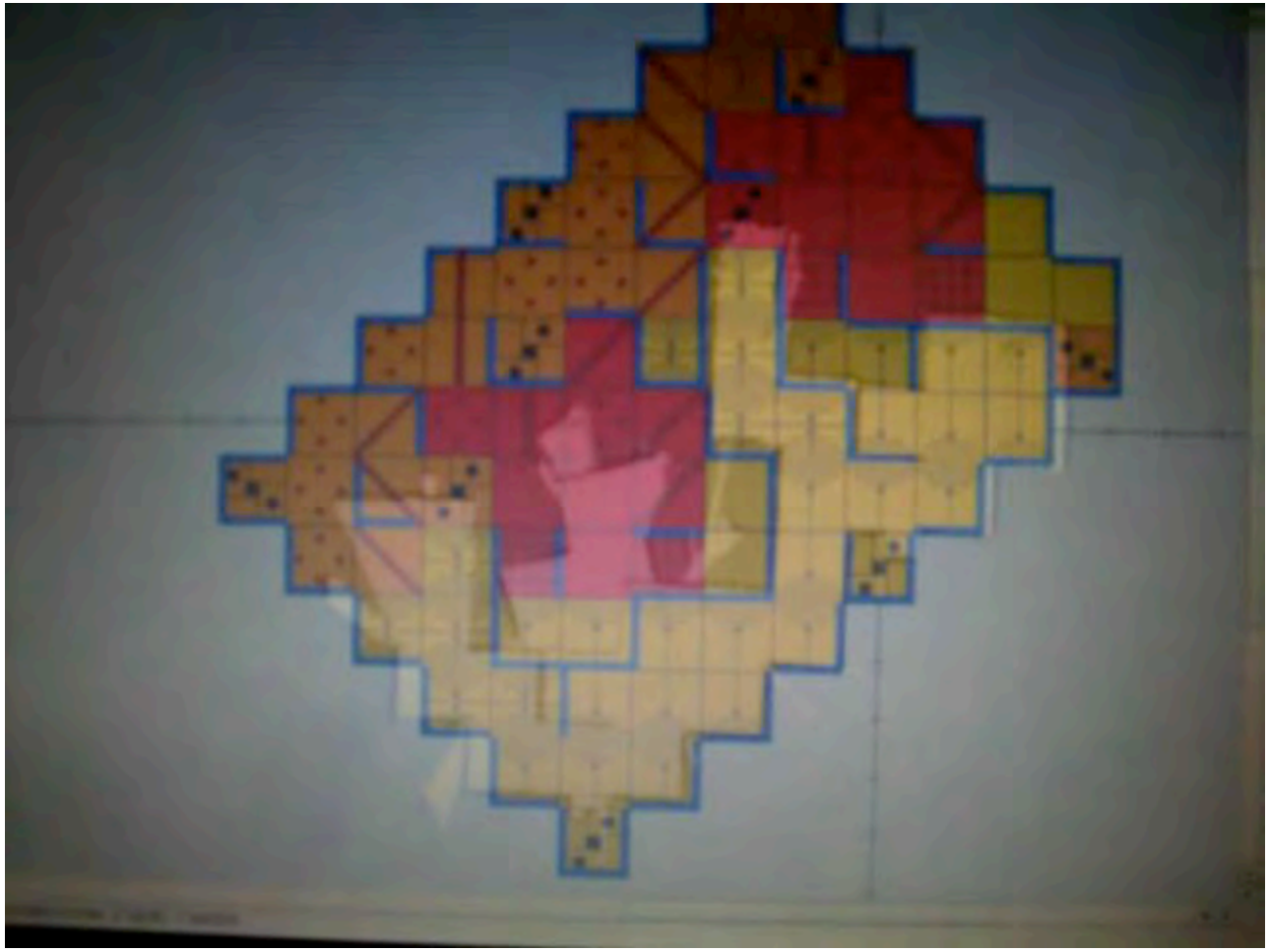


# Jacobs Rescue Robot, Jacobs Univ Bremen, Germany

## *2nd Best-in-Class Autonomy/Mapping*

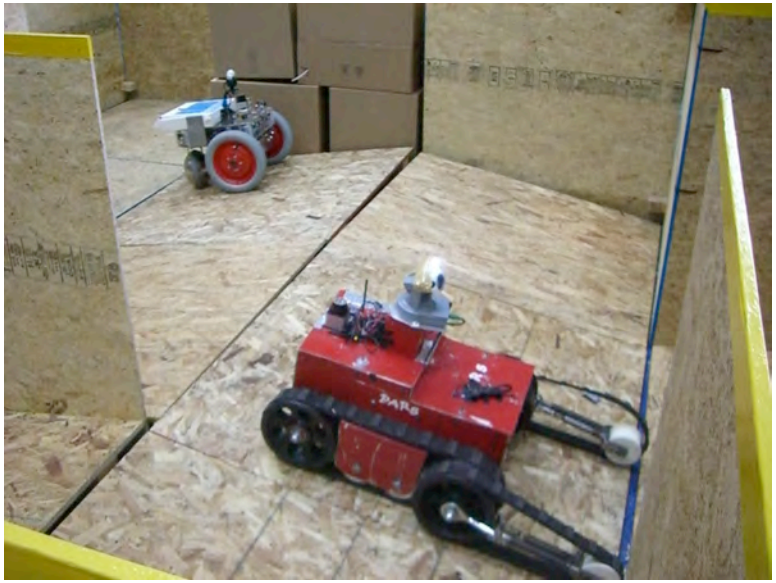
GEOTIFF map format allowed direct comparison to ground truth arena layout!
This will be REQUIRED for all team maps in 2008.

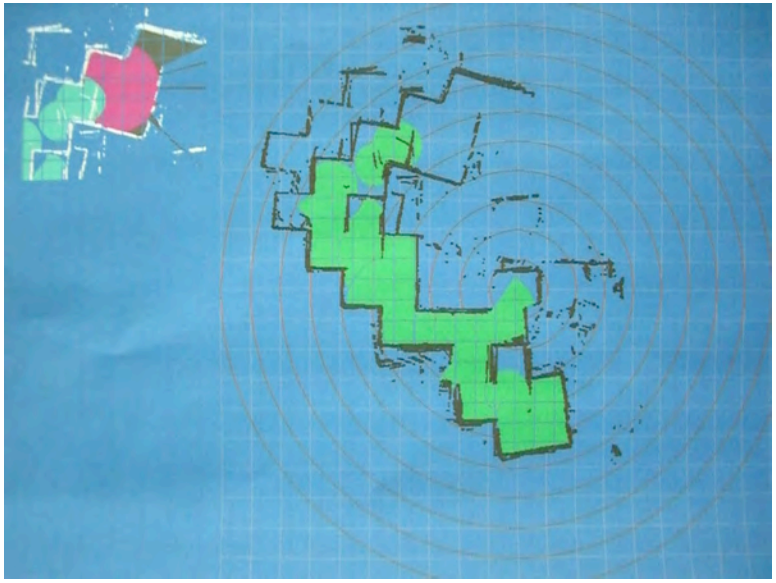


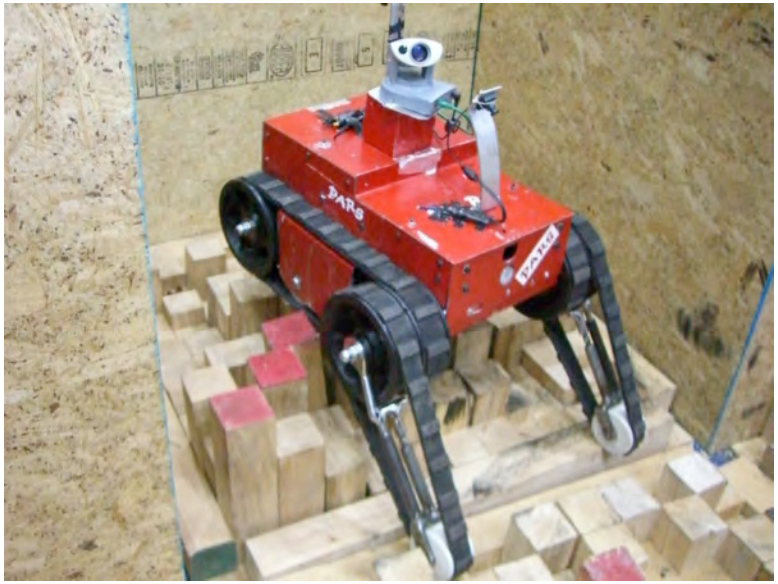


# RFC Uppsala University, Sweden (shown with PARS, Iran)

## *3rd Best-in-Class Autonomy/Mapping*



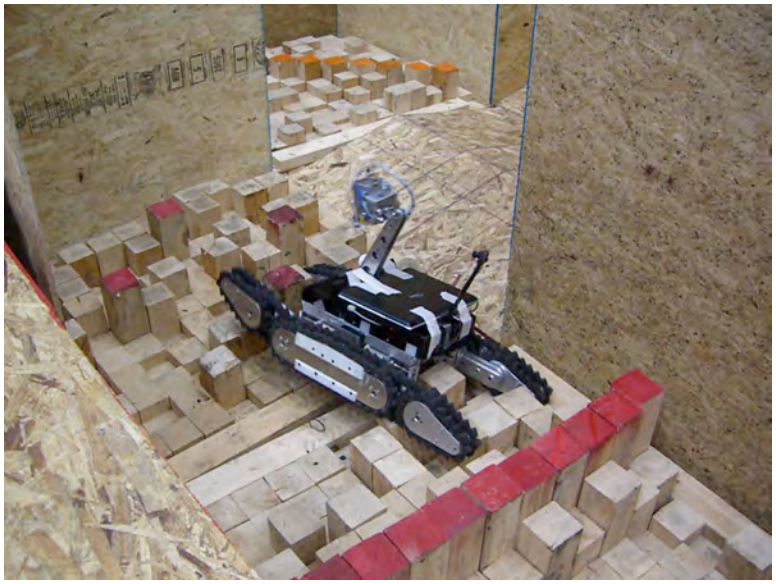


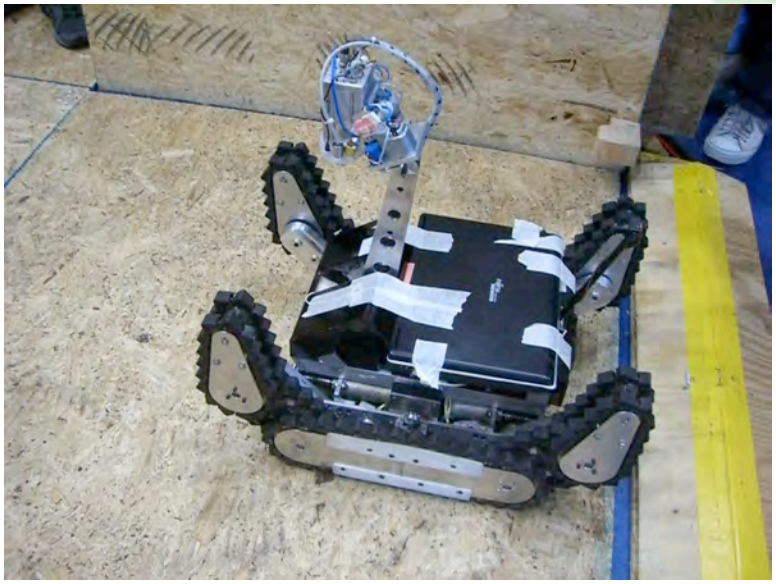


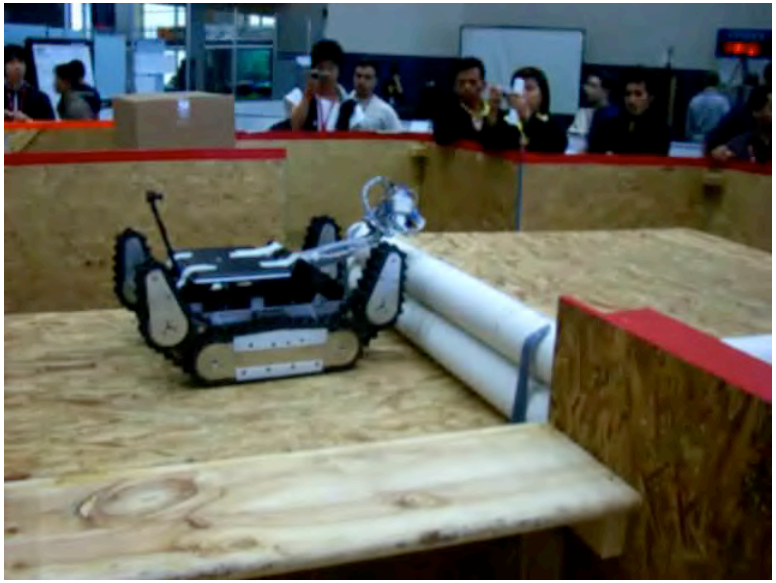
# Resquake, K.N. Toosi Univ of Technology, Iran

## Innovative Operator Interfaces

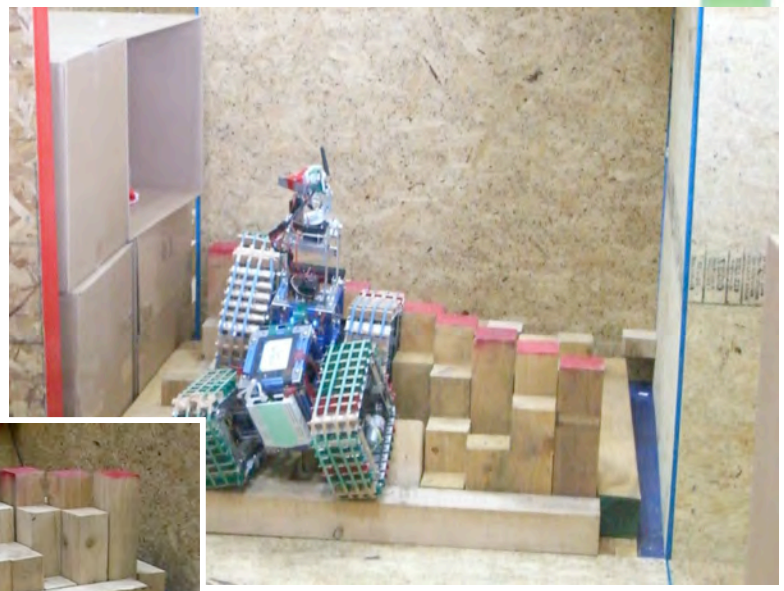
**(steering wheel, camera mast joystick, voice commands for preset flipper positions)**

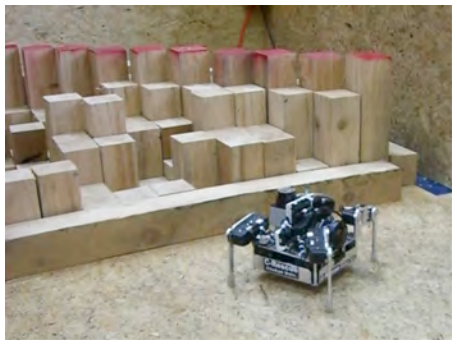


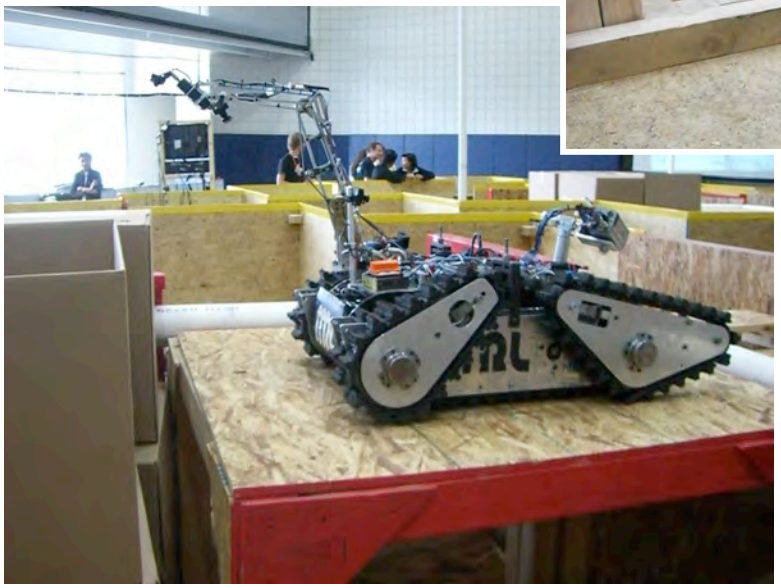




# Ideal, NIIT Blue, MRL, Casualty, C-Rescue
# Innovative Mobility, Sensors, and Interfaces

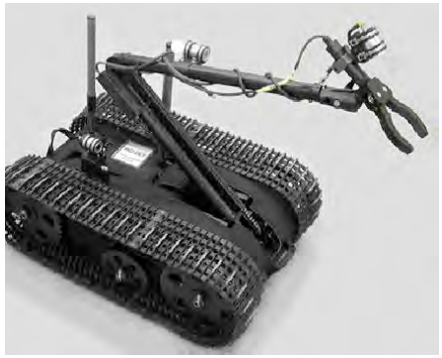


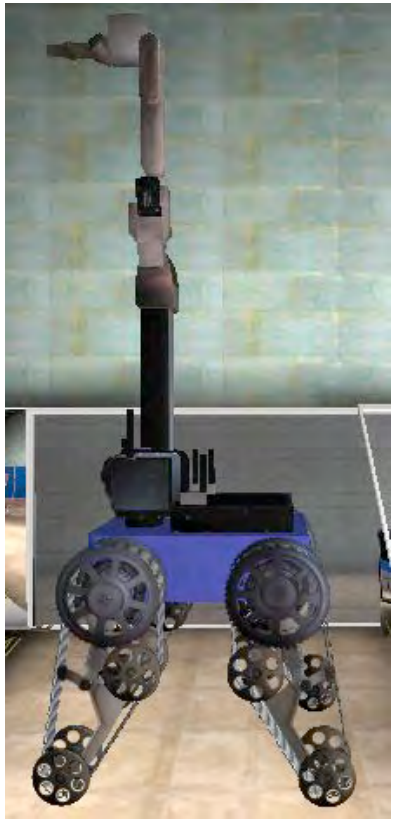
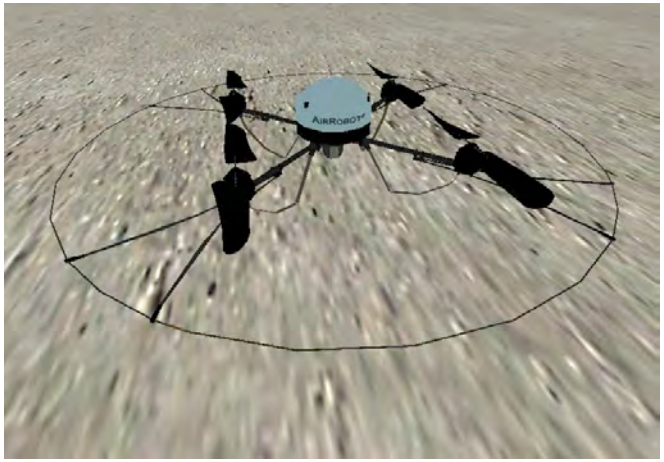
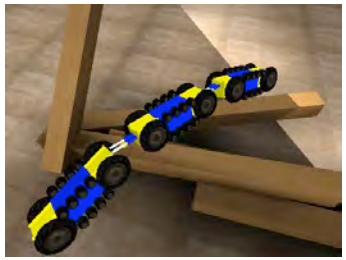
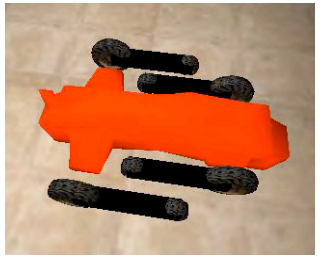




# RoboCupRescue Virtual Robot League
## Modeled Robots and Sensors

- Response robots
  - Talon
  - Telemax
  - AirRobot
- Research robots
  - Souryu
  - Tarantula
  - ATRV-Jr
- Sensors
  - Cameras (pan/tilt, illumination)
  - Lline scan laser
  - Flash lidar
  - Acoustic
  - Touch
  - Odometry
  - IMU
  - RFID
- Model your own…



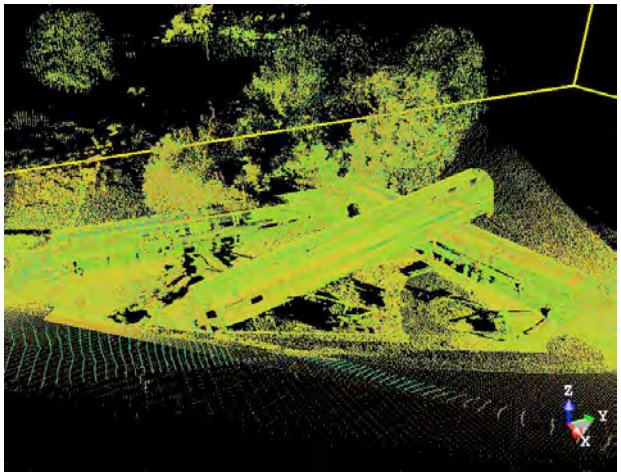





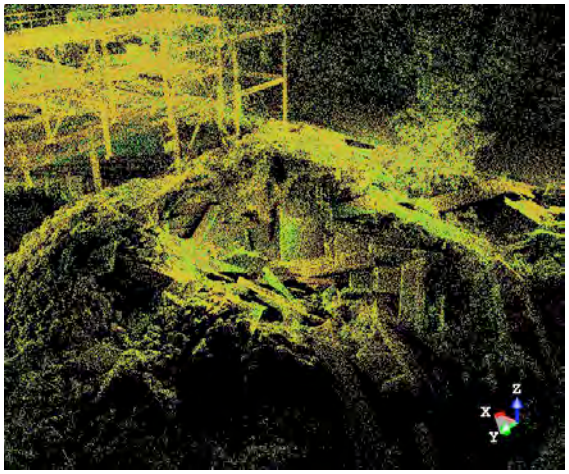
# RoboCupRescue Virtual Robot League
# Modeled Environments

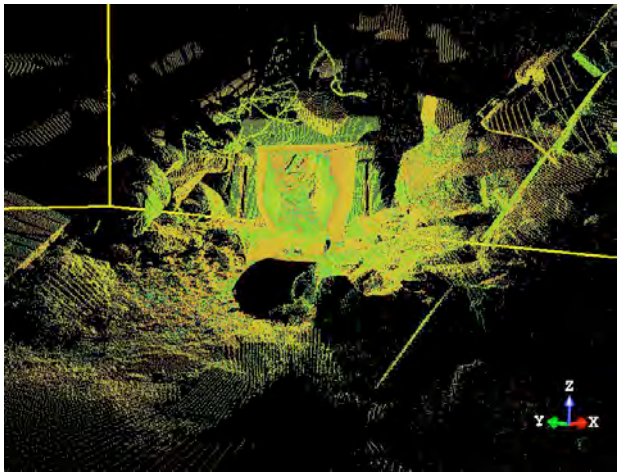
- Practice Environments
  - Emerging Standard Robot Test Methods (validated for friction)
  - Larger scenarios
  - Cooperative robot searches

# RoboCupRescue Virtual Robot League
# Modeled Environments

Working toward validation of laser scanned props from FEMA training sites
- Robot practice
- Responder practice
- Robot behavior development and assistive features



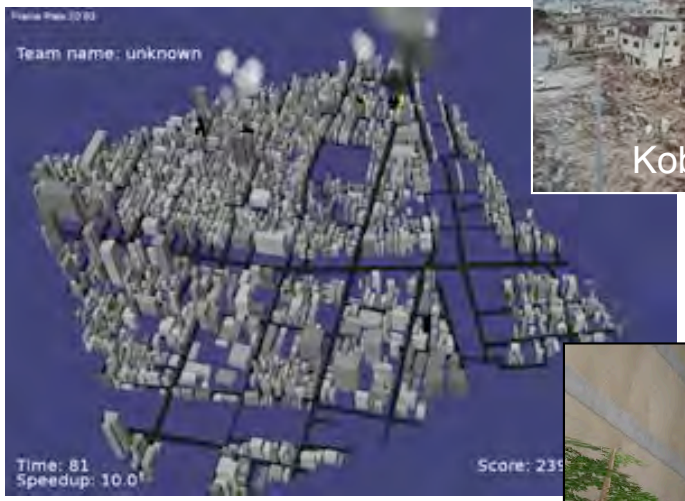




# RoboCupRescue Leagues
# Three Complimentary Competitions

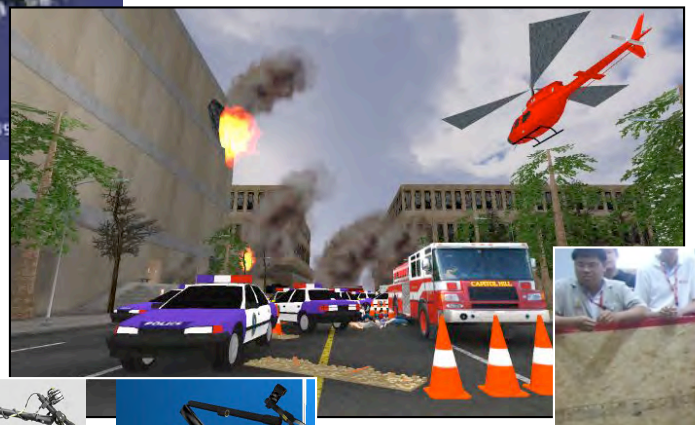
RoboCupRescue Simulation League

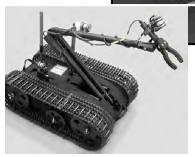
*Citywide Logistics*



RoboCupRescue Virtual Robot League

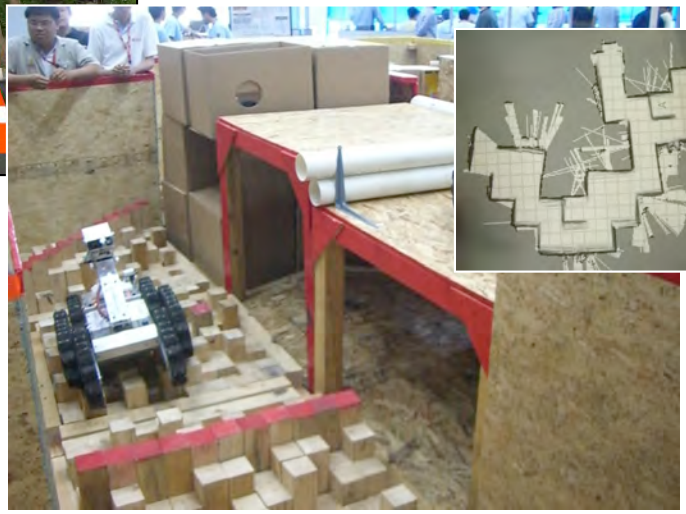
*Multiple robots, larger scenarios*

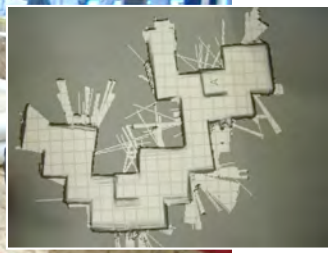




RoboCupRescue Real Robot League

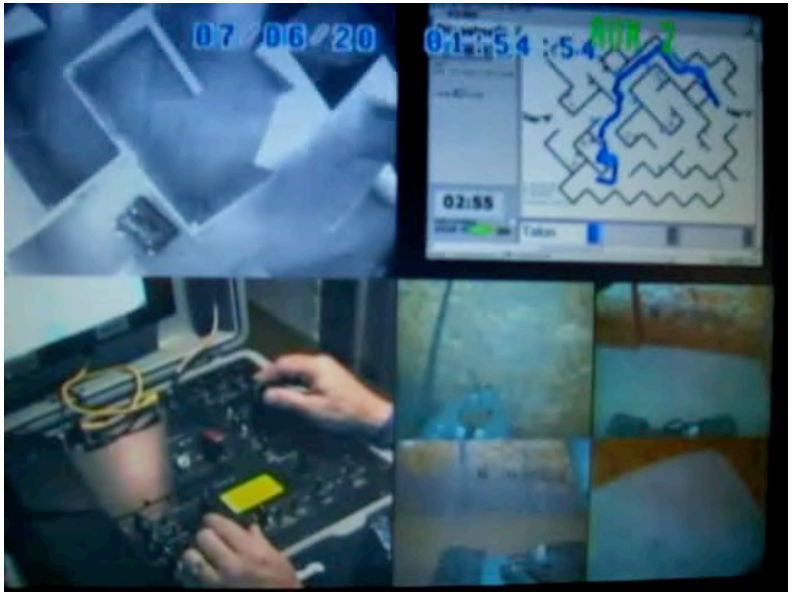
*Advanced mobility, mapping complex environments, assistive capabilities*





# RoboCupRescue Robot League
# Accomplishments This Year

- Leverage of emerging standard test methods for response robots
- Non-flat flooring throughout the arenas challenging autonomy and mapping
- 2D GeoTiff maps with ground truth comparison (next year for scoring)
- Ultra wideband tracking of robot position within arena
- Quad-screen performance capture
  - Tracking position
  - Operator interface
  - Operator actions
  - Robot situation
- Capture and dissemination of sensor data sets
  - 3D range imagers
  - 3D rotating line scans
  - Thermal sensors
  - Stereo vision



# RoboCupRescue Robot League Roadmap

- Encourage autonomous behaviors on all robots (first victim in Orange and Red arenas)
- Manipulation tasks (last victim in each arena)
  - Door opening (push/pull, assorted knobs)
  - Placing items (radio, water)
  - Picking items (sample, ID badge)
- Continue integration with Virtual Robot Competition
  - GeoTiff mapping
  - Autonomous behaviors in complex environments
  - Robot design improvements
- Lighter weight operator stations (single operator deployment)
- A bracket of common robot platforms similar to legged league: Rhex, Volksbot, Kenaf, ???
- More regional opens supported by proliferation of practice arenas
- Disseminate best-in-class implementations at camp
- Centralize repository of data, algorithms, etc.
- Publish, publish, publish… especially best-in-class implementations

# Workforce Development at the Frontier of DHS Science, Technology, Engineering and Mathematics

S&T Stakeholders' Conference West

January, 2008

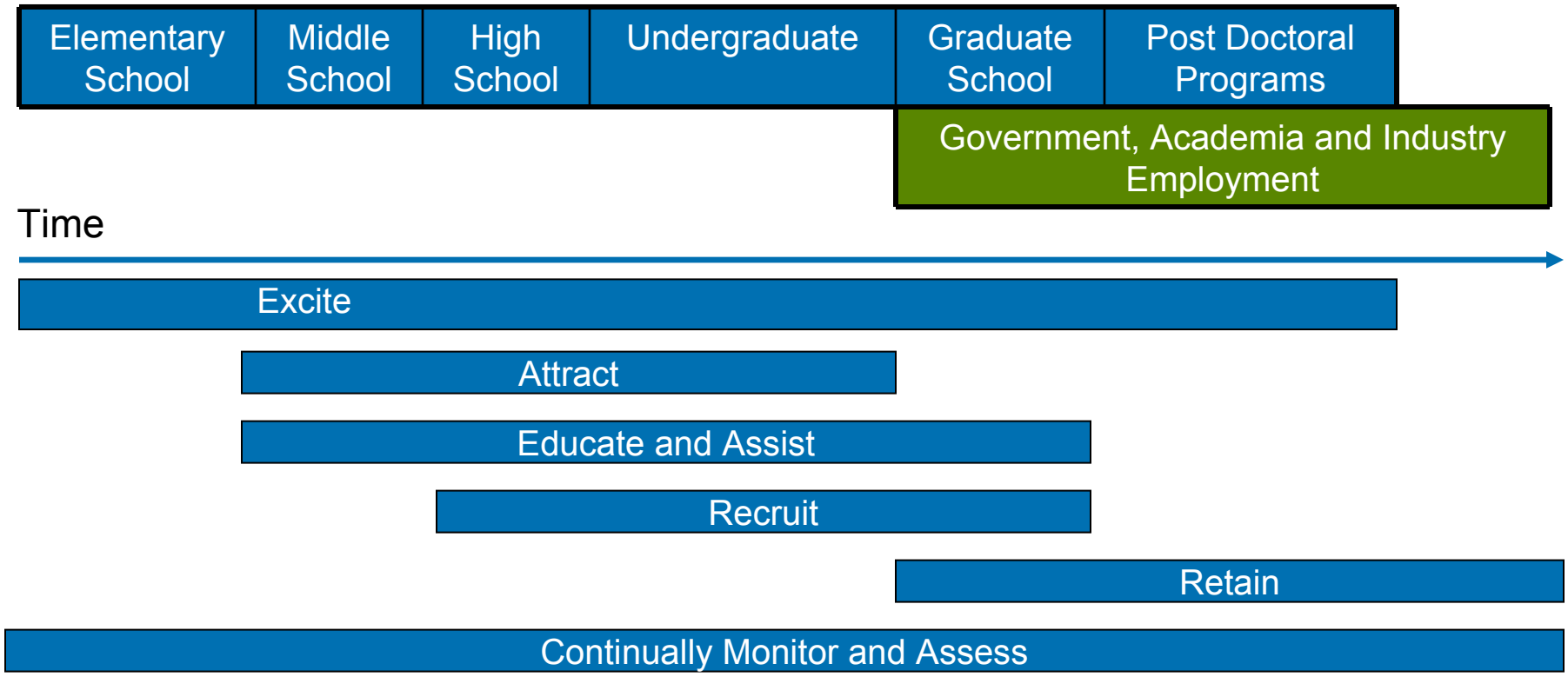
# Quick Review of Our Objective:

- DHS S&T Directorate Goal #3
  - "In conjunction with other public and private institutions, proactively provide leadership, opportunities and resources to maintain and develop the necessary intellectual basis for a national S&T workforce and focused research disciplines that will ensure the safety of our homeland."

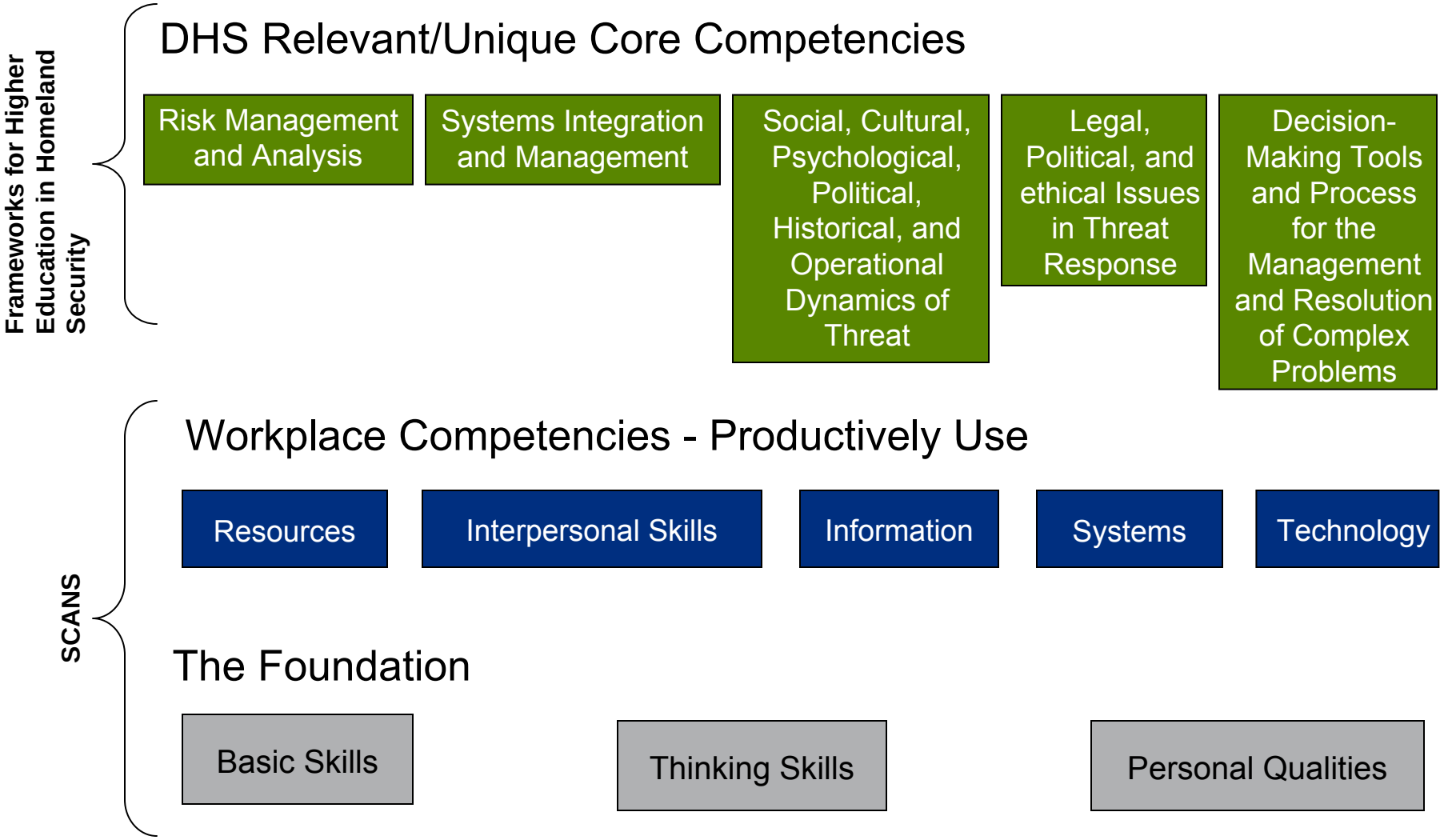
# Workforce Development at the Frontier of DHS relevant STEM

- This session will address a DHS sponsored initiative to apply innovative content delivery strategies to the task of developing the future workforce. The session will include an in-depth look at the field of immersive games and simulations in addition to an update on a specific DHS initiative that addresses immersive simulations for the middle school population. Attendees will be provided with an opportunity to bring this initiative back to their communities.
  - Moderator, Mr. Tom Kowalczyk, DHS Office of University Programs
  - Dr. Mike Zyda, Director of USC GamePipe Lab, USC
  - Dr. Isaac Maya, Research Director, CREATE, USC
  - Mr. Daniel Wendel, Teacher Education Program, MIT
  - Mr. Adam Jascoff, NIST, Dept. of Commerce
  - Ms. Cindy Randall, FIRST (For Inspiration and Recognition of Science and Technology)

# DHS S&T Workforce Development Strategy



# DHS Relevant/Unique Core Competencies



# STEM Workforce Development View from 60,000 Feet

- National Academy Report (Feb 2006) – Rising Above the Gathering Storm provides a current perspective and action plan for Energizing and Employing America for a Brighter Economic Future.
- Rising Above the Gathering Storm included a model Science, Technology, Engineering and Mathematics (STEM) Workforce Development Strategy.
- The National Academy Convocation on the report (September 25, 2006) examined actions at the State/Regional/Local Level.
- Social Cognitive Career Theory says" 'start with math self-efficacy.'

# Opportunities for the Private Sector

**Thomas A. Cellucci, Ph.D., MBA**
Chief Commercialization Officer
Department of Homeland Security
Science and Technology
Email: Thomas.Cellucci@dhs.gov

Homeland Security

# Discussion Guide

- Overview of Department of Homeland Security
- Reasons to Partner with DHS-S&T
- Integrated Product Teams: IPTs
- Market Potential is Catalyst for Rapid New Product Development
- Safety Act Protection
- Tech Clearing House
- SBIR Opportunities
- Getting Involved
- Summary

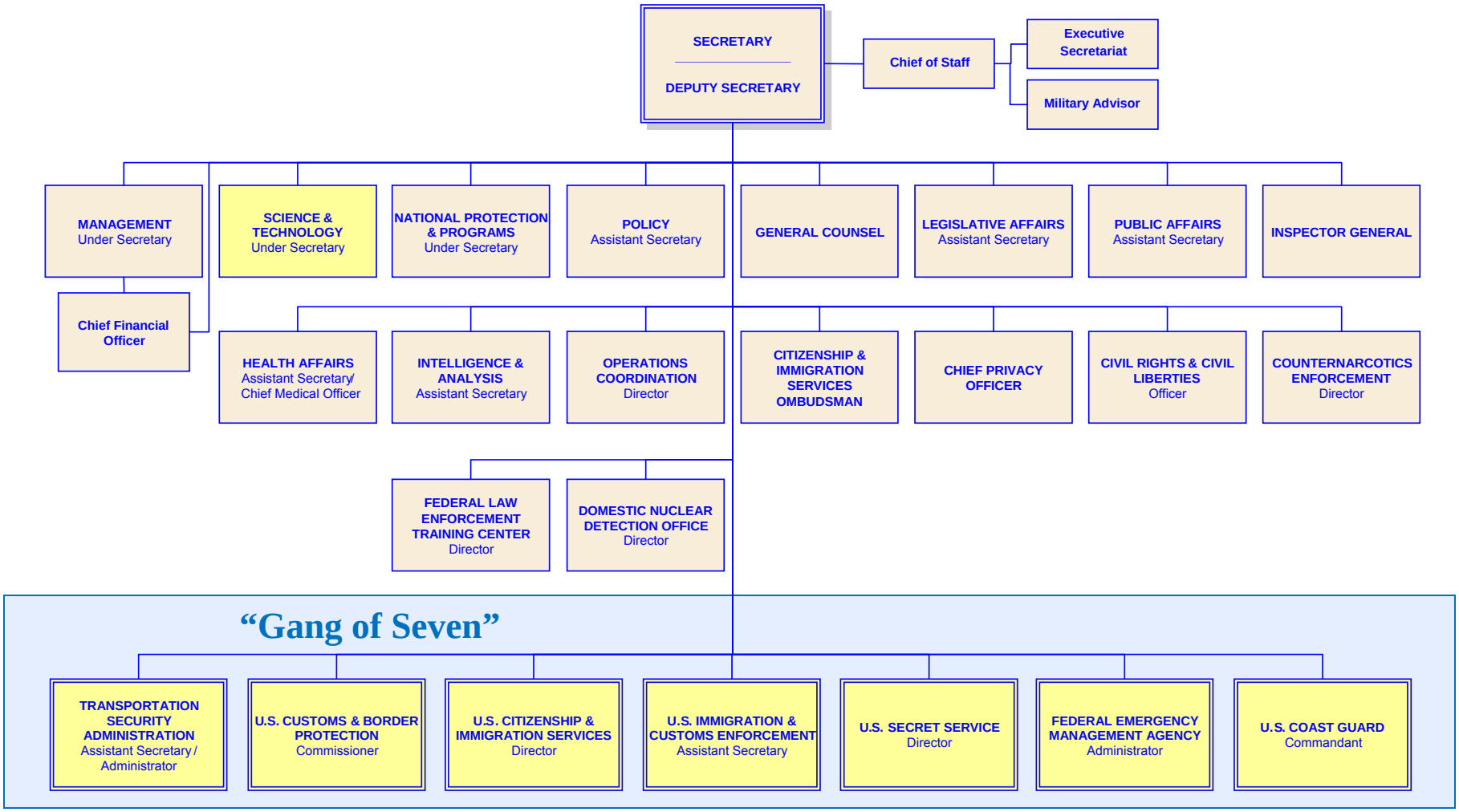
Homeland Security

# Homeland Security Mission

- Lead Unified National Effort to Secure America
- Prevent Terrorist Attacks Within the U.S.
- Respond to Threats and Hazards to the Nation
- Ensure Safe and Secure Borders
- Welcome Lawful Immigrants and Visitors
- Promote Free Flow of Commerce

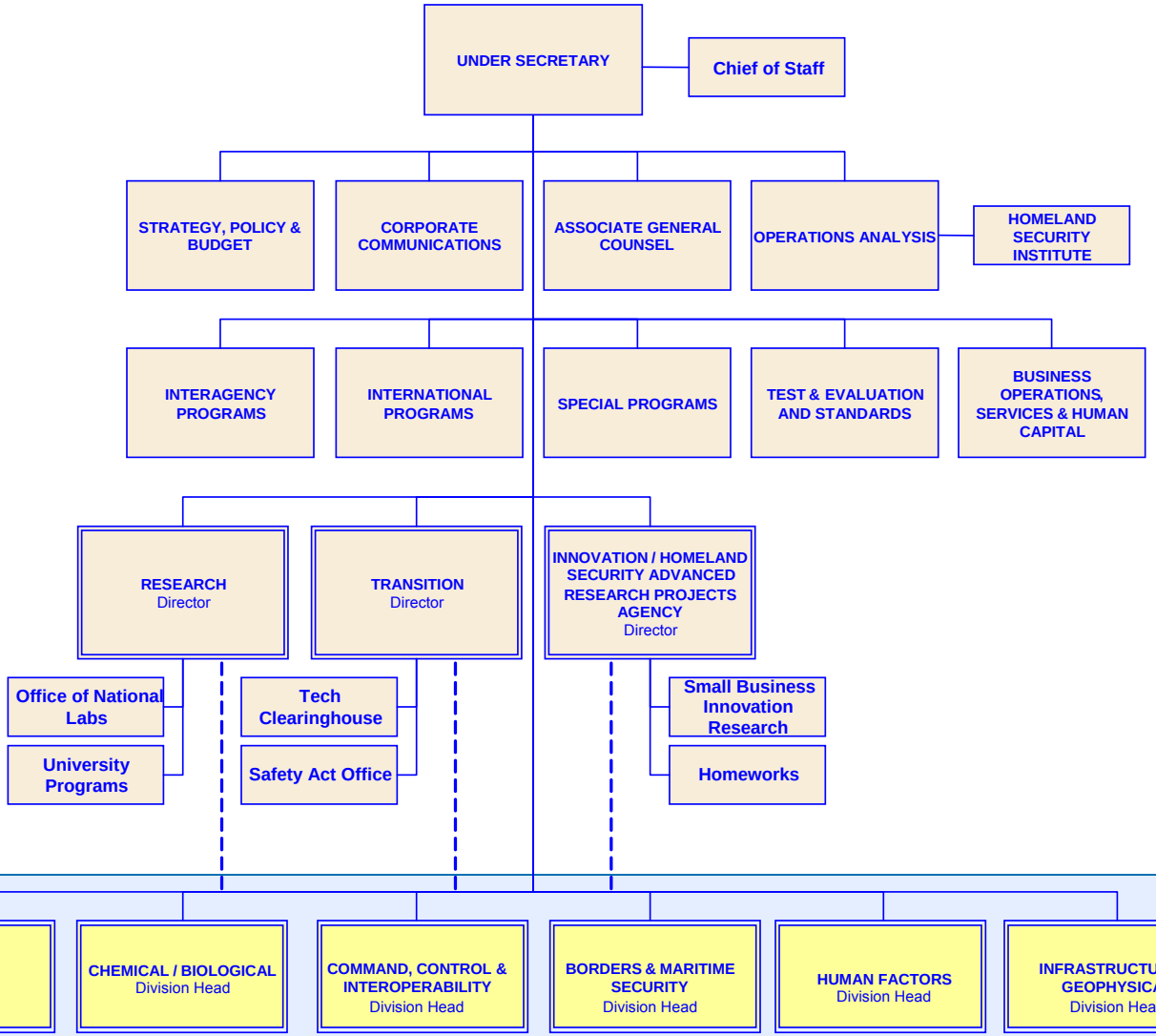
Homeland Security

# U.S. Department of Homeland Security




Homeland Security

# Office of the Under Secretary for Science and Technology




**Divisions Drive S&T Interactions with Customers**

# S&T Goals

**Consistent with the Homeland Security Act of 2002**

- **Accelerate the delivery of enhanced technological capabilities** to meet the requirements and fill capability gaps to support DHS agencies in accomplishing their mission.
- Establish a lean and agile world-class S&T management team to deliver the technological advantage necessary to ensure DHS Agency mission success and prevent technological surprise.
- Provide leadership, research and educational opportunities and resources to develop the necessary intellectual basis to enable a national S&T workforce to secure the homeland.

Homeland Security

# DHS S&T Investment Portfolio

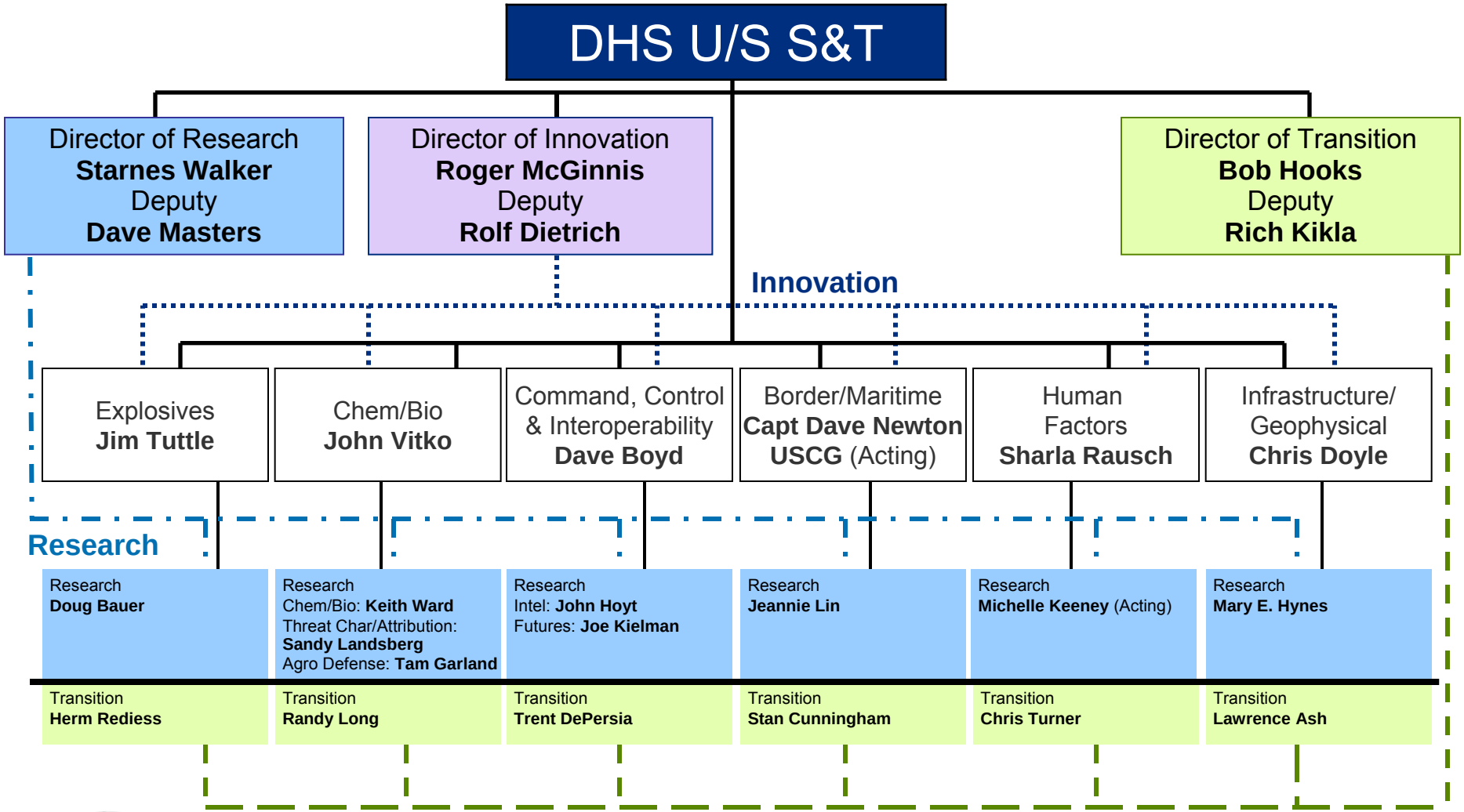
## Balance of Risk, Cost, Impact, and Time to Delivery

| | |
|---|---|
| **Product Transition (0-3 yrs)**<br>• Focused on delivering near-term products/enhancements to acquisition<br>• Customer IPT controlled<br>• Cost, schedule, capability metrics | **Innovative Capabilities (1-5 yrs)**<br>• High-risk/High payoff<br>• "Game changer/Leap ahead"<br>• Prototype, Test and Deploy<br>• HSARPA |
| **Basic Research (>8 yrs)**<br>• Enables future paradigm changes<br>• University fundamental research<br>• Gov't lab discovery and invention | **Other (0-8+ yrs)**<br>• Test & Evaluation and Standards<br>• Laboratory Operations & Construction<br>• Required by Administration (HSPDs)<br>• Congressional direction/law |

**Customer Focused, Output Oriented**

Homeland Security

# S&T Organization

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# Three Step Approach:
# Keep it Simple and Make it Easy

1. Develop Detailed Requirements And Relay Conservative Market Potential

2. Establish Strategic Partnerships
   - Business Case Information
   - Open Competition
   - Detailed Mutual Responsibilities

3. Deliver Products!

Homeland Security

# Private Sector Outreach Process

## Requirements Identification through Product Release

| PHASES | Requirements Development | Market Assessment & Strategy | Open Competition | Product Development | Product Release, Marketing and/or Deployment |
|---|---|---|---|---|---|
| ACTIVITIES | • Prioritized capability gaps from Capstone IPTs<br>• Identification of representatives of end users and end customers<br>• Operational and technical requirements<br>• Validation of price points<br>• Technology Commercialization Agreement (TCA) between DHS S&T and its DHS customer<br>• Project plan | • Market survey<br>• Technology scan<br>• Communications plan and implementation (public relations and marketing communications)<br>• Technology Commercialization Plan (TCP)<br>• Test and Evaluation Master Plan (TEMP)<br>• Standards assessment and/or development by S&T<br>• Grant program development by DHS customer | • CRADAs<br>• BAAs<br>• RFPs<br>• RFQs<br>• RFIs<br>• MoUs / MoAs<br>• Technology transfer licenses<br>• OTAs<br>• Influence the private sector | • New Product Development (NPD) process implemented by private sector partner(s)<br>• Project reviews<br>• Test and Evaluation | • Transition to manufacture<br>• QC/QA<br>• Deployment (to Federal users) or Marketing (to independent users)<br>• Measure product effectiveness |

Homeland Security

Legend: Black text = Government activities
Grey text = Private-sector activities

# *10 Reasons to Partner with* DHS Science & Technology

**Reasons:**

**Economics-based**

**Public Relations-based**

**Business Development-based**

**Strategic Marketing-based**

**Technical Resources-based**

1. Access the Sizeable DHS Market and Ancillary Markets
2. Leverage the Financial Strength/Stability of DHS and off-set R&D costs through participation in mutually beneficial cost-sharing Programs
3. Utilize the SAFETY Act to gain liability protection and access DHS' array of PR and Market Communications services
4. Effectively reach the First Responders Market through FEMA-sponsored grant programs, the AEL (Approved Equipment List), other sponsored equipment lists and fast-track programs
5. Team with Science & Technology Personnel to leverage a vast Network of Laboratory Facilities for Technology and Product Development
6. Gain access to Test and Evaluation (T&E) Facilities for Product Development and actively participate in the generation of Standards, T&E methods and Regulations used at the tribal, local, state, and federal levels
7. Meet and establish Partnerships with others in the University, Business, and National Lab Communities
8. Potentially generate Licensing revenue and capture potential Derivative Product revenue
9. Leverage SBIRs, HITS and HIPS to gain experience with homeland security applications
10. Make a Real Difference by Developing Products to Defend the Homeland for Generations to come as well as gain recognition as a Corporate Citizen contributing to the Security of our Homeland

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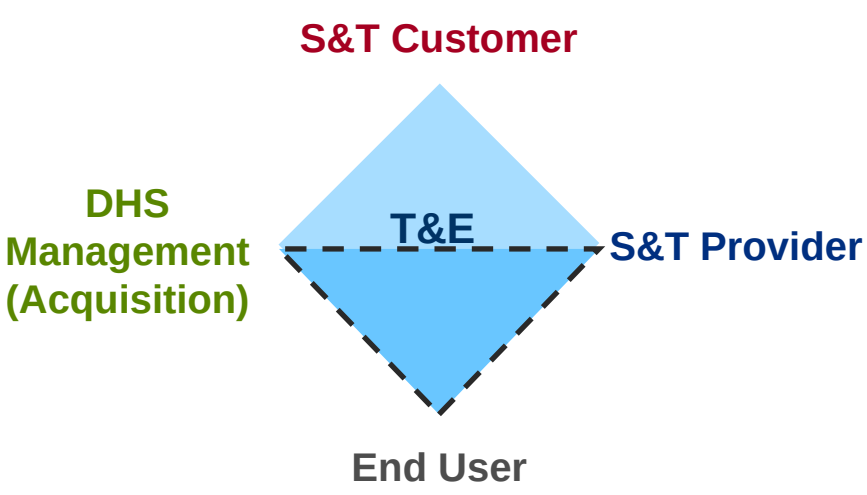
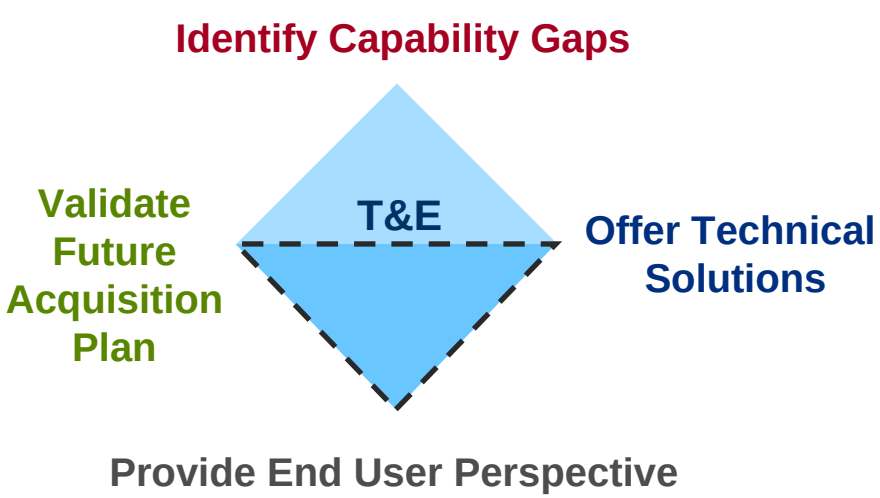
# S&T Transition IPT Members and Function




- Industry Board of Directors Model
- Consensus-driven Process



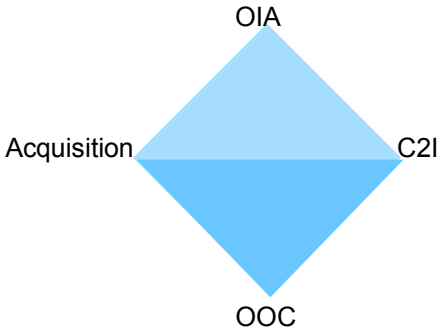

End Result :
Prioritized Investments in S&T

Homeland Security

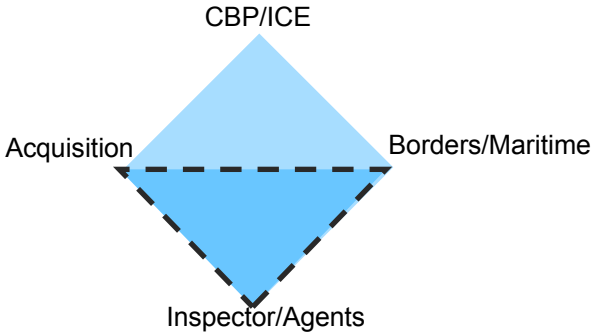
# DHS Requirements/Capability Capstone IPTs

## DHS S&T Output – "Enabling Homeland Capabilities" (EHCs)

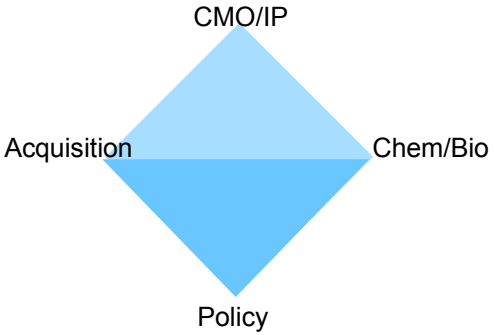
### Information Sharing/Mgmt



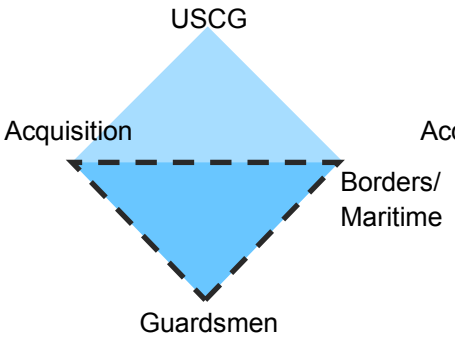

### Border Security



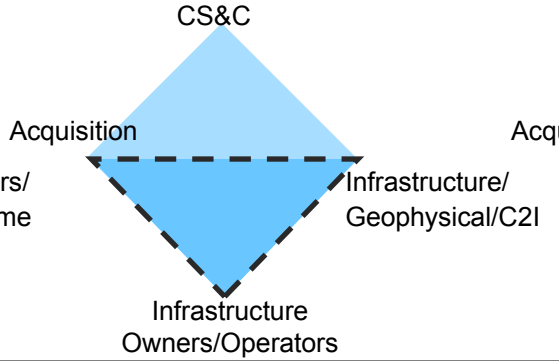

### Chem/Bio Defense



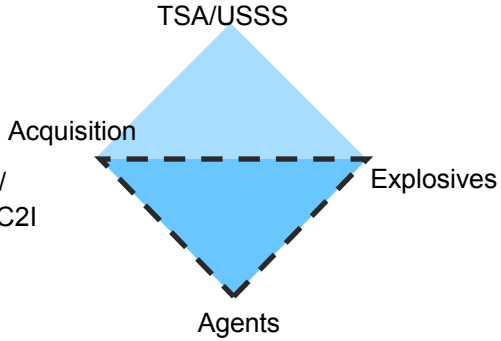

### Maritime Security



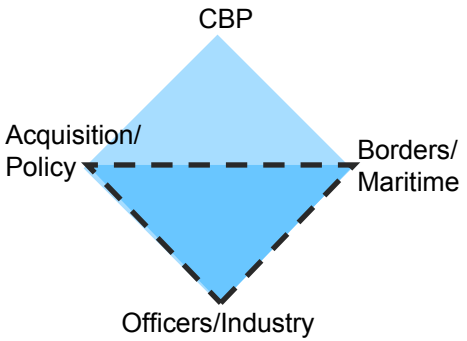

### Cyber Security



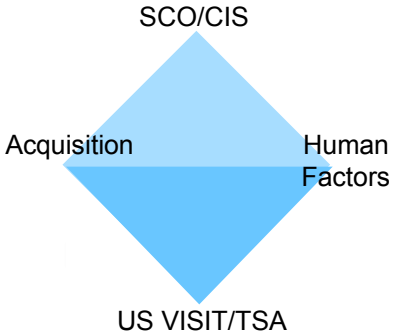

### Explosive Prevention



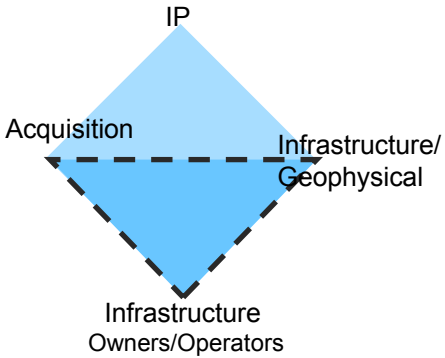

### Cargo Security




### People Screening

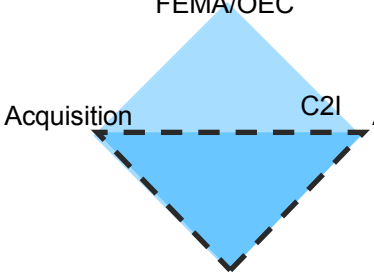



### Infrastructure Protection

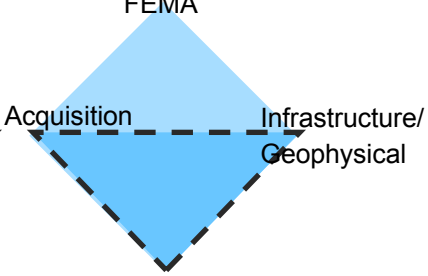



### Incident Management

***Interoperability***

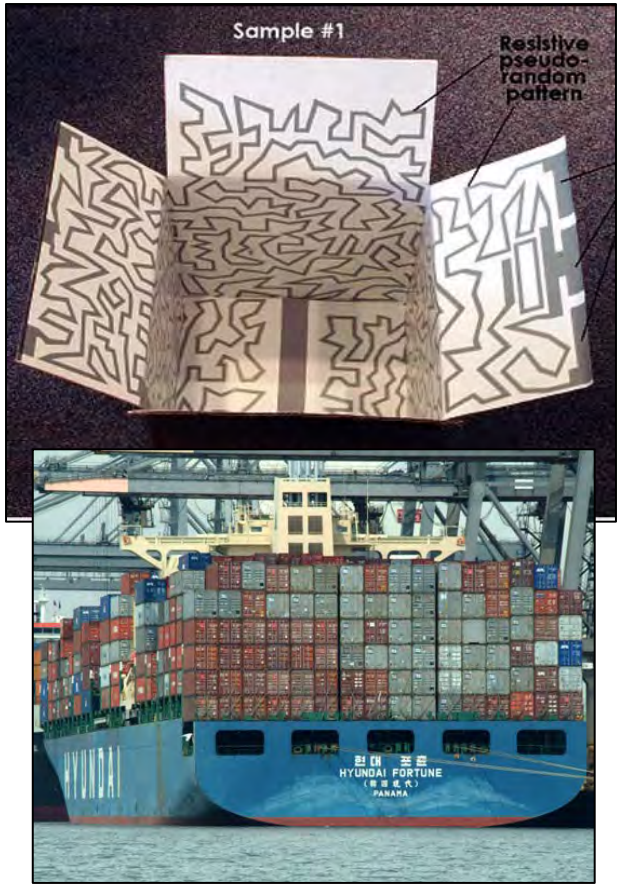



***Prep & Response***



# Cargo Security

## Representative Technology Needs




- Enhanced screening and examination by non-intrusive inspection
- Increased information fusion, anomaly detection, Automatic Target Recognition capability
- Detect and identify WMD materials and contraband
- Capability to screen 100% of air cargo
- Test the feasibility of seal security; detection of intrusion
- Track domestic high-threat cargo
- Harden air cargo conveyances and containers
- Positive ID of cargo and detection of intrusion or unauthorized access

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# Maritime Security

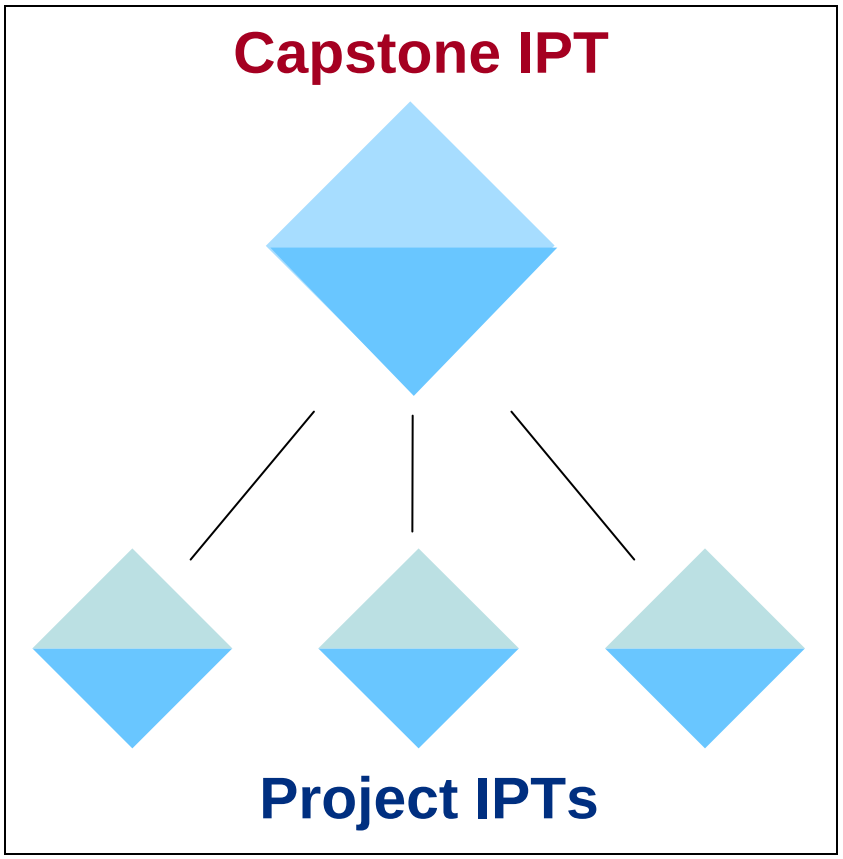
## Representative Technology Needs

- Wide-area surveillance from the coast to beyond the horizon; port and inland waterways region – detect, ID, and track
- Data fusion and automated tool for command center operations
- Vessel compliance through non-lethal compliance methods
- Enhanced capability to continuously track contraband on ships or containers
- Improved ballistic personal protective equipment for officer safety
- Improved WMD detection equipment for officer safety; improved screening capability for WMD for maritime security checkpoints

Homeland Security

# Establishment of Project IPTs: Detailed Specifications/Requirements

- Members:
  - S&T Program Manager(s)
  - Operating Component's Program Manager(s)
  - End-User
  - Supplier/Provider
- Meet at Least Monthly
- Report to Capstone IPT Quarterly

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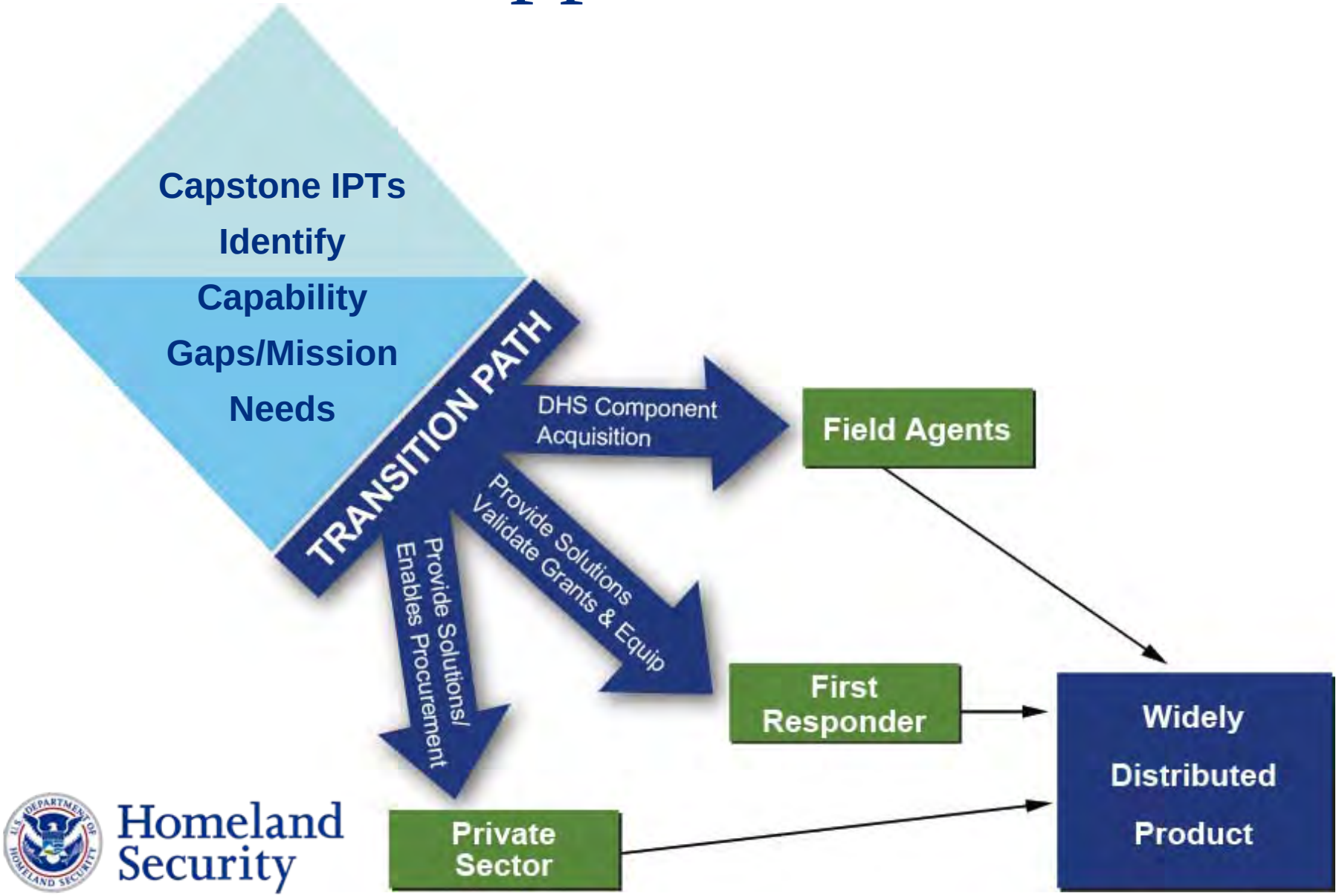
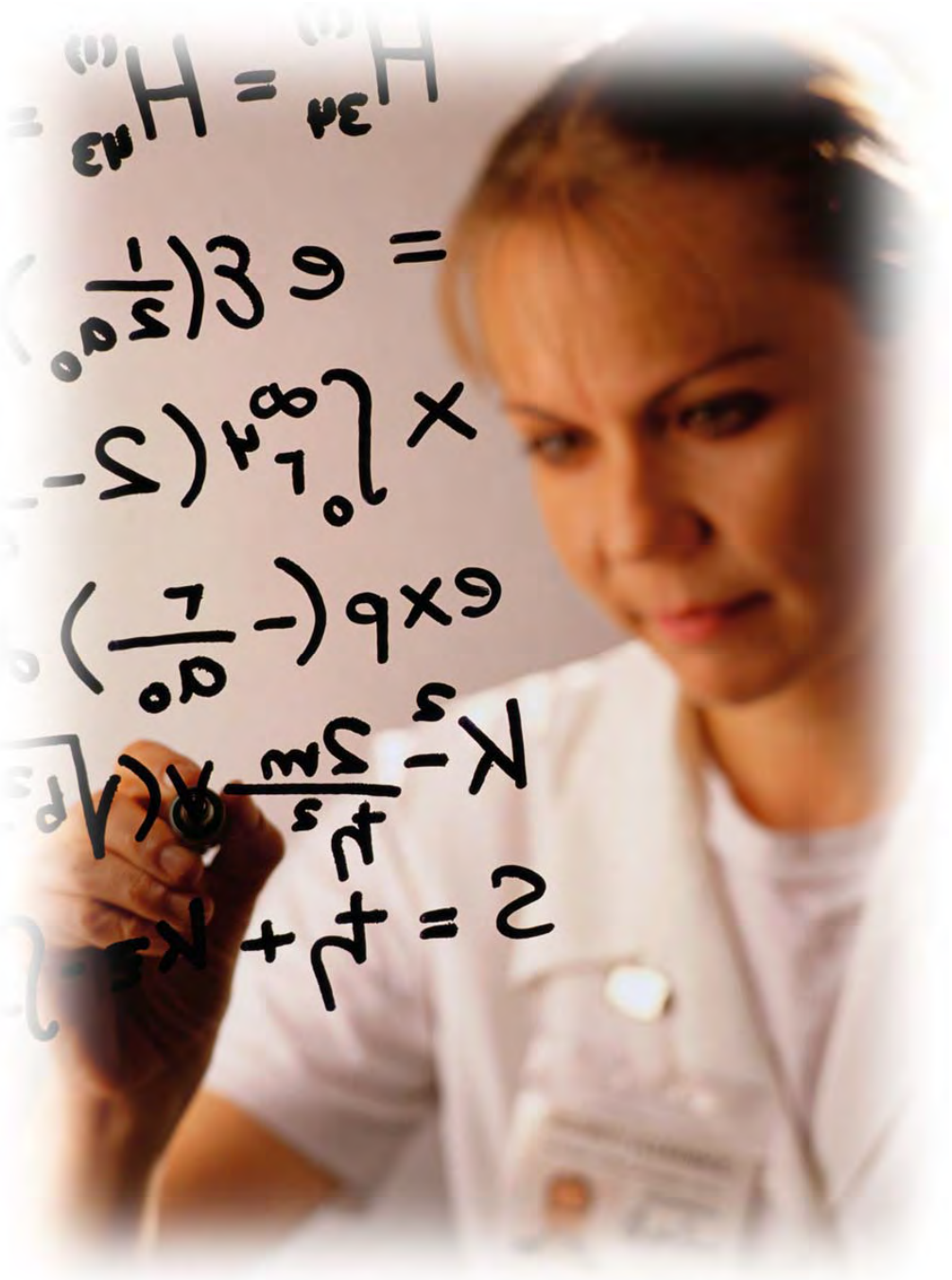
# Transition Approaches



# Getting on the "Same Page"

- Historical Perspective
- Language is Key
- Communication is Paramount



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# Technology Readiness Levels (TRLs): Overview

## TRLs are NASA-generated and Used Extensively by DoD

| | | |
|---|---|---|
| Basic principles observed and reported | 1 | Basic |
| Technology concept and/or application formulated | 2 | |
| Analytical and experimental critical function and/or characteristic | 3 | |
| Component and/or breadboard validation in laboratory environment | 4 | Applied |
| Component and/or breadboard validation in relevant environment | 5 | |
| System/subsystem model or prototype demonstration in a relevant environment | 6 | Advanced |
| System prototype demonstration in a operational environment | 7 | |
| Actual system completed and 'flight qualified' through test and demonstration | 8 | |
| Actual system 'flight proven' through successful mission operations | 9 | |

TECHNOLOGY MATURITY

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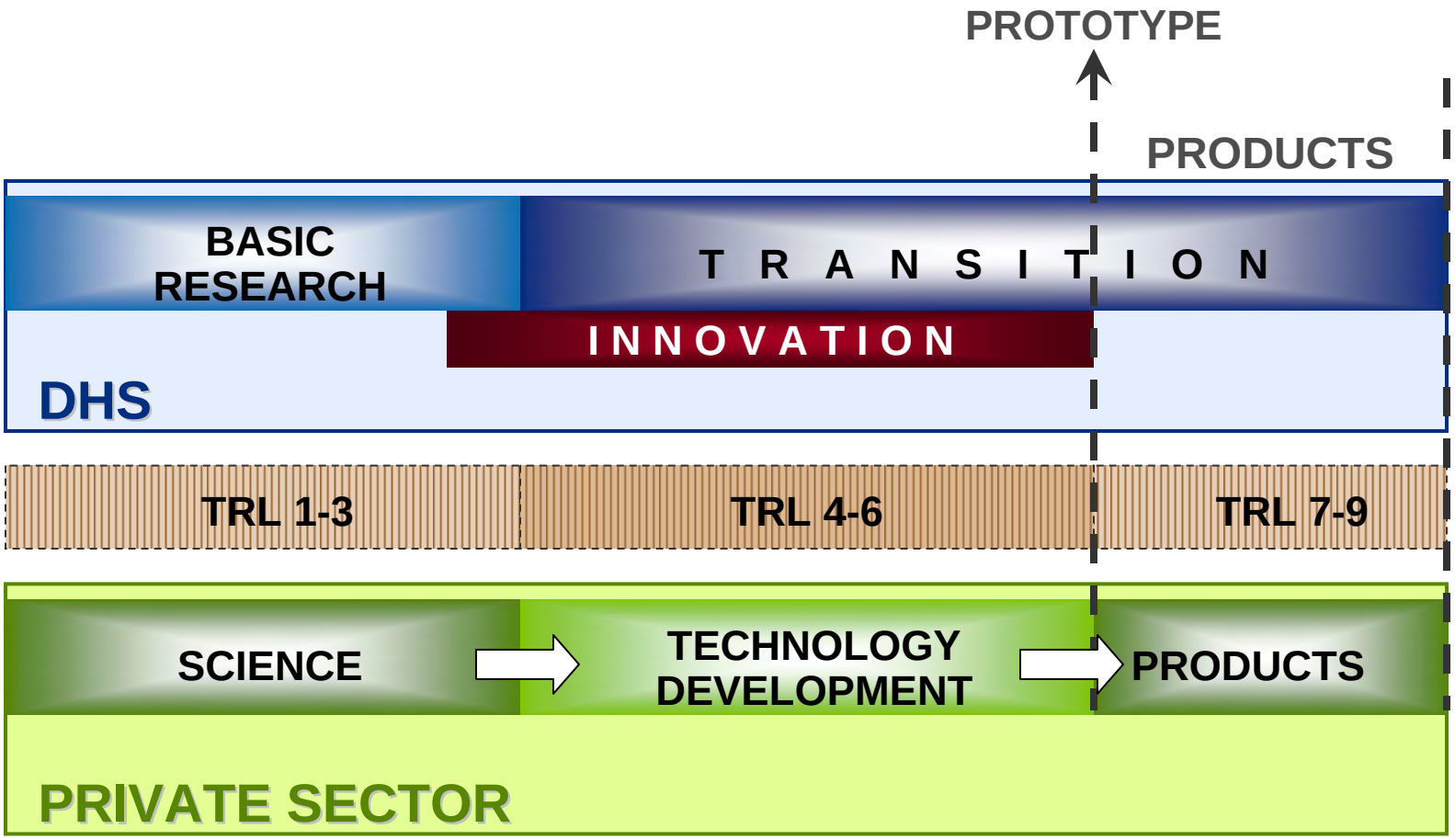
# Correlation: DHS and Private Sector

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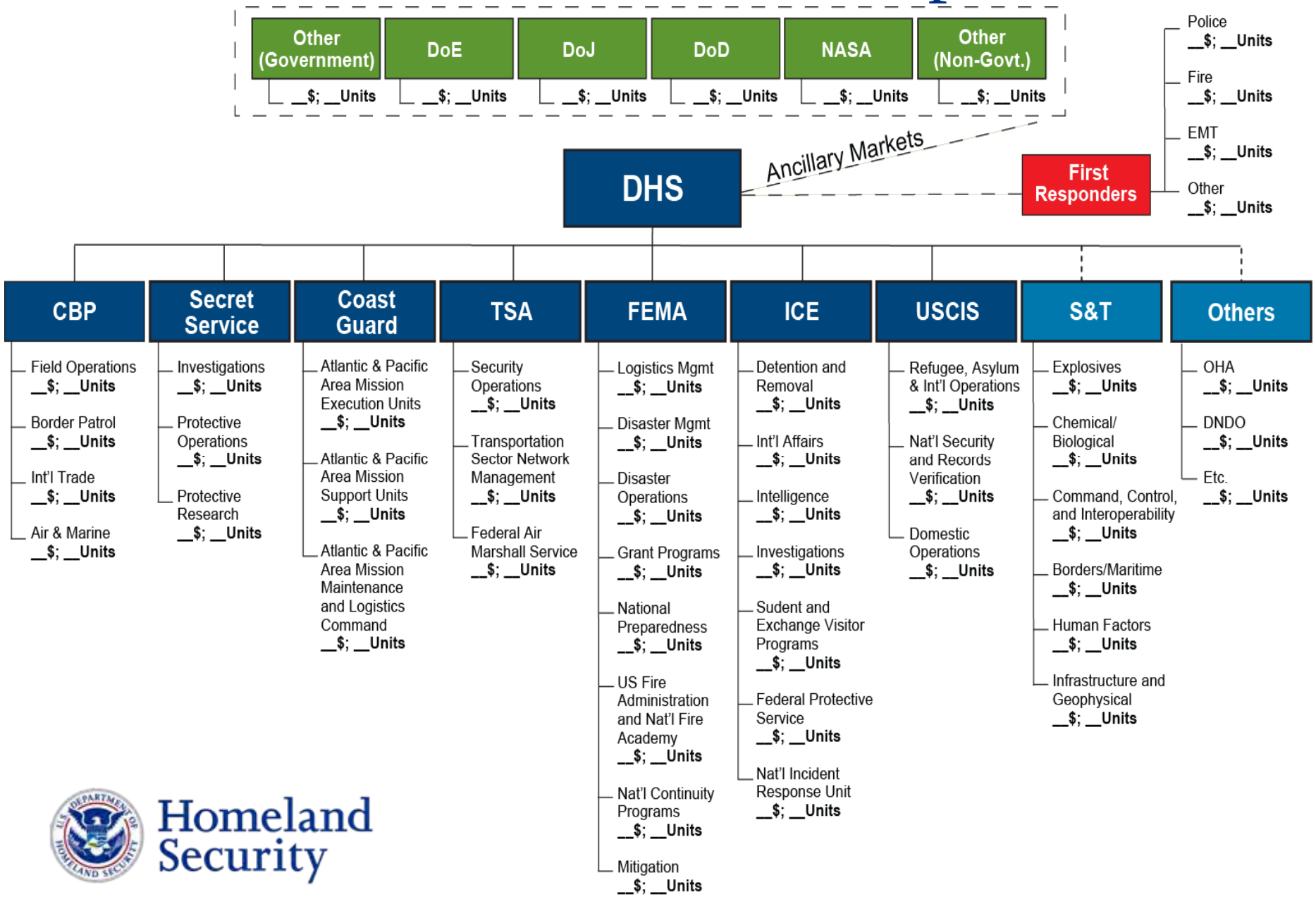
# Market Potential Template

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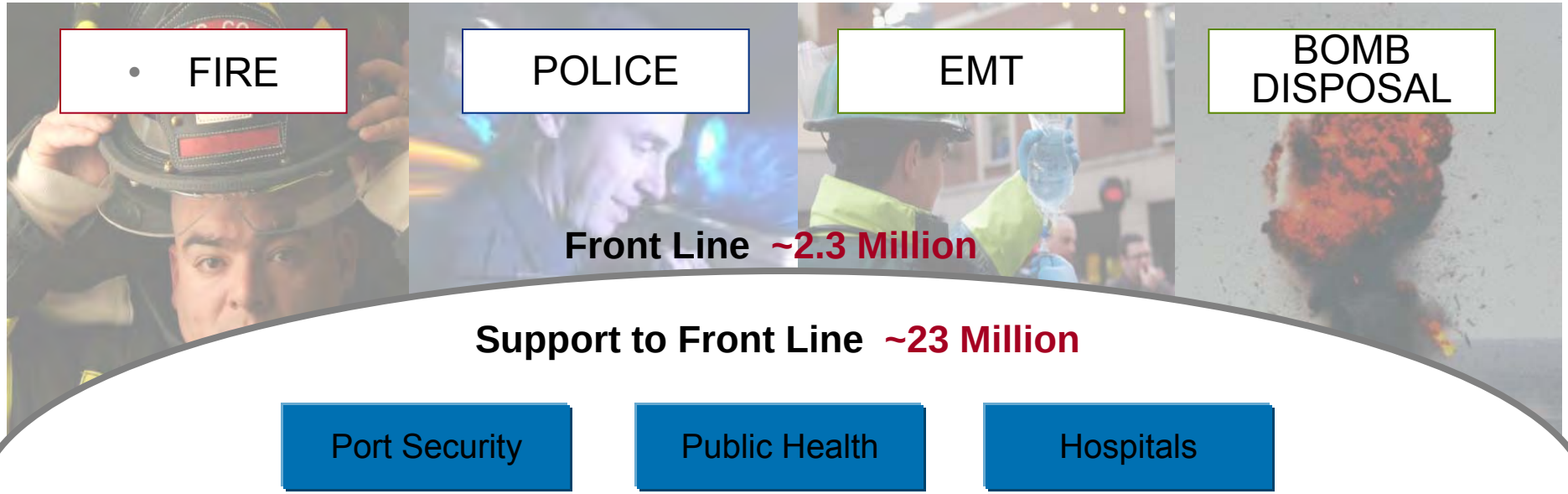
# Conservative Estimate: Number of First Responders in the US

- Homeland Security Presidential Directive 8
- Steve Golubic (FEMA)

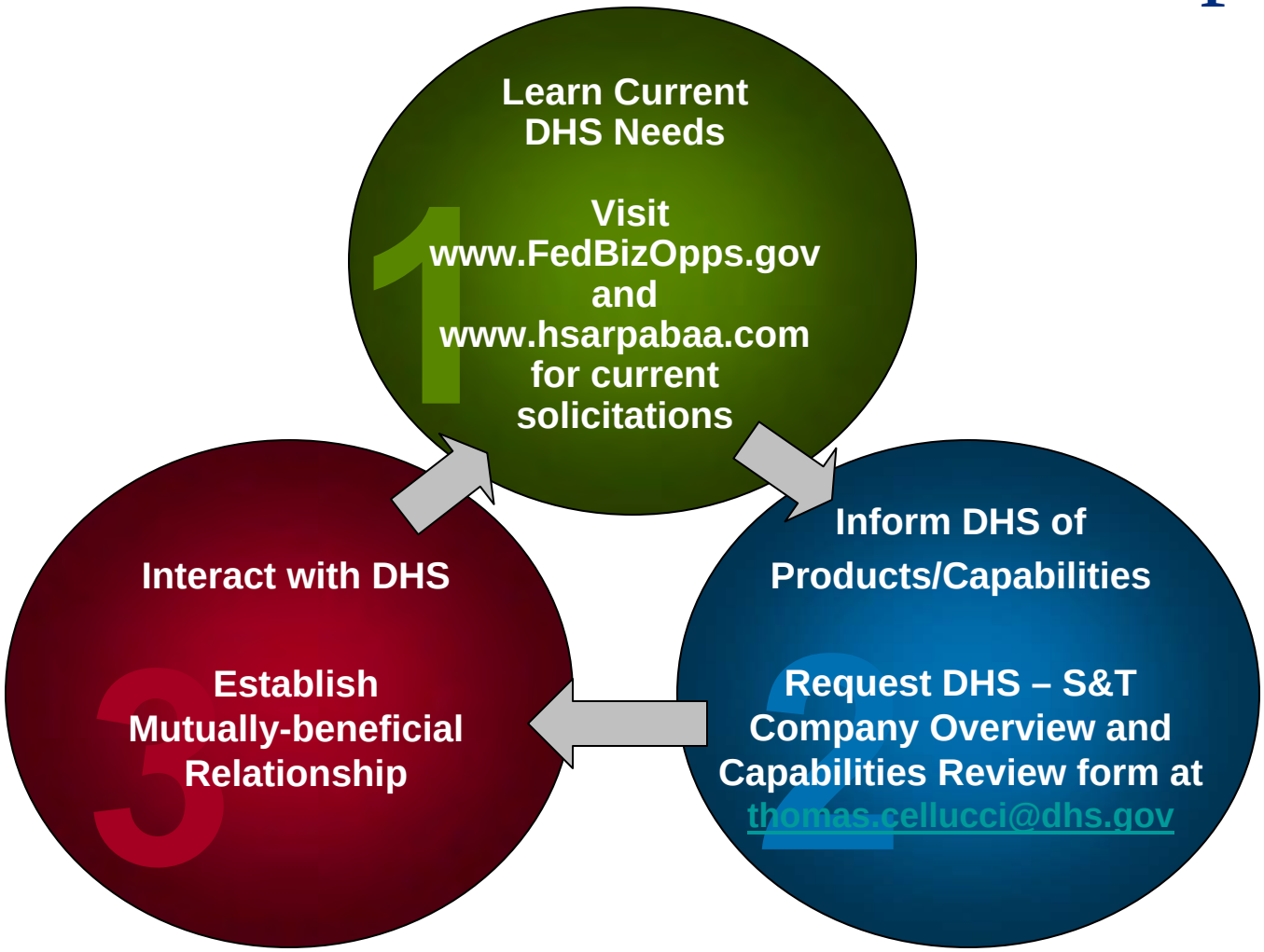
**Total: ~25.3 Million Individuals**




**Support to Front Line ~23 Million**

- Port Security
- Public Health
- Hospitals
- Transportation
- Emergency Management
- Clinics
- Venue Security
- Public Works/Utility
- School Security
- Response Volunteers

# Call to Action: Mutual Benefits Create "Win-Win" Relationships

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# Federal Business Opportunities

Sites where the Office of Procurement Operations (OPO) posts opportunities for perspective suppliers to offer solutions to DHS – S&T's needs:

- www.FedBizOpps.gov
- www.HSARPAbaa.com
- www.SBIR.dhs.gov
- www.Grants.gov

## take advantage of...

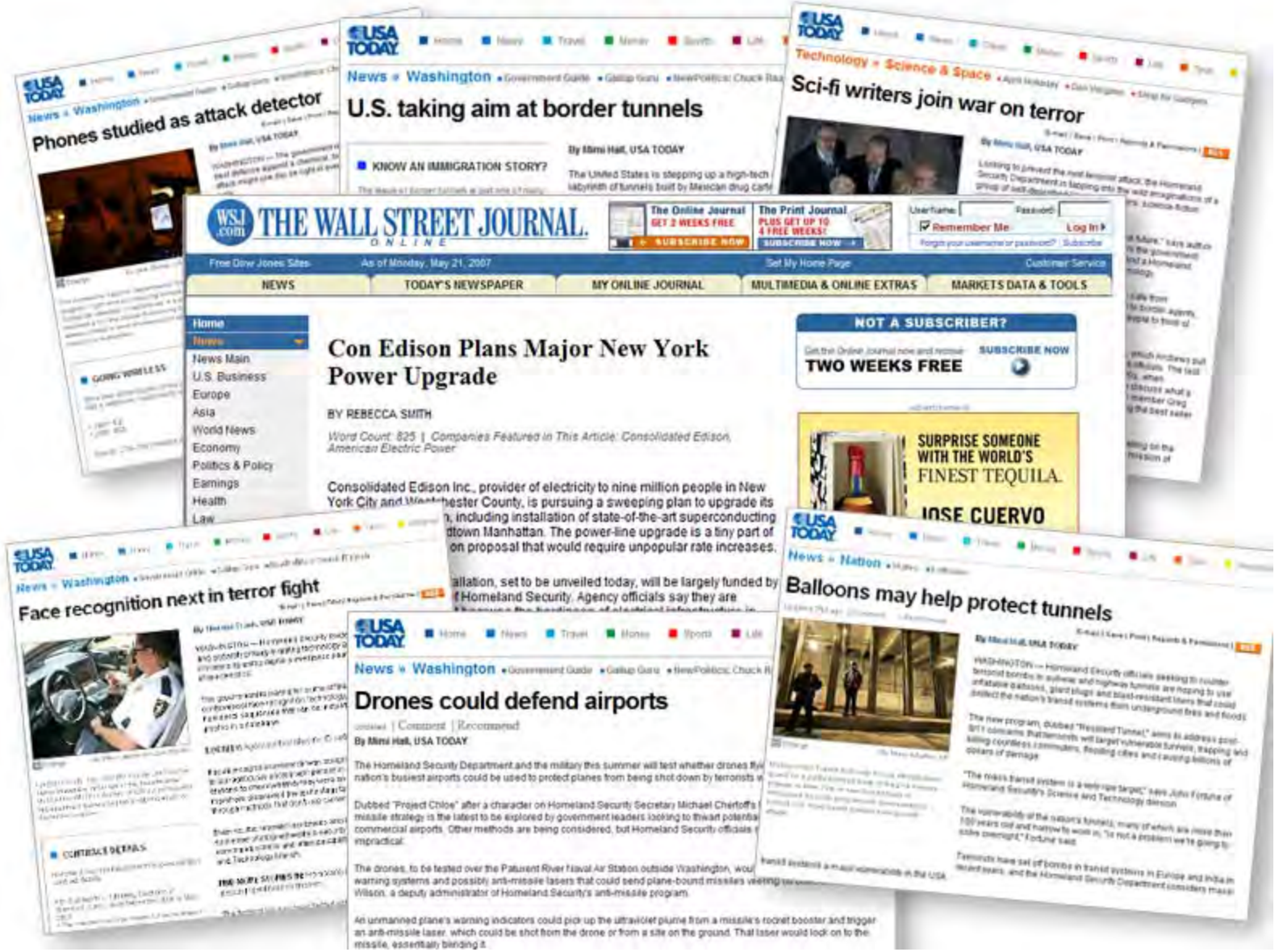
- **Vendor Notification Service:** Sign up to receive procurement announcements and solicitations/BAA amendment releases, and general procurement announcements. http://www.fedbizopps.gov
- **S&T's HSARPA website:** Register to join the HSARPA mailing list to receive various meeting and solicitation announcements. Link to Representative High Priority Technology Areas, where DHS areas of interest can be found. http://www.hsarpabaa.com
- **Truly Innovative and Unique Solution**: Refer to Part 15.6 of the Federal Acquisition Regulation (FAR) which provides specific criteria that must be met before a unsolicited proposal can be submitted to Kathy Ferrell. http://www.acquisition.gov/far/current/html/Subpart%2015_6.html

Homeland Security

**Contact Information:**
Kathy Ferrell
Department of Homeland Security
Office of the Chief Procurement Officer
245 Murray Dr., Bldg. 410
Washington, DC 20528
unsolicited.proposal@dhs.gov
202-447-5576

# More Opportunities with DHS Science and Technology

# S&T Innovation in the News



# SAFETY Act

## Support Anti-Terrorism by Fostering Effective Technologies Act of 2002

- Enables the development and deployment of qualified anti-terrorism technologies
- Provides important legal liability protections for manufacturers and sellers of effective technologies
- Removes barriers to industry investments in new and unique technologies
- Creates market incentives for industry to invest in measures to enhance our homeland security
- The SAFETY Act liability protections apply to a vast range of technologies, including:
  - Products
  - Services
  - Software and other forms of intellectual property (IP)

Examples of eligible technologies:

- Threat and vulnerability assessment services
- Detection Systems
- Blast Mitigation Materials
- Screening Services
- Sensors and Sensor Integration
- Vaccines
- Metal Detectors
- Decision Support Software
- Security Services
- Data Mining Software

# Criteria as stated in the SAFETY Act

- ✓ Is it an Anti-Terrorism Technology?
- ✓ Is it effective and available?
- ✓ Does it possess large potential third party liability risk exposure?
- ✓ Does Seller need SAFETY Act?
- ✓ Does it perform as intended?
- ✓ Does it conform to Seller's specifications?
- ✓ Is it safe for use as intended?

Addition SAFETY Act information…

Online: www.safetyact.gov  Email: helpdesk@safetyact.gov

Toll-Free: 1-866-788-9318

Homeland Security

# Award Criteria

| | Developmental Testing and Evaluation (DT&E) | Designation | Certification |
|---|---|---|---|
| **Effectiveness Evaluation Conclusion** | Needs more proof, has potential | Demonstrated effectiveness, i.e. Developmental testing (with confidence of repeatability) | Consistently proven effectiveness, i.e. operational performance (with high confidence of enduring effectiveness) |
| **Protection** | Liability cap<br>• only for identified test event(s) and for limited duration (=3yrs) | Liability cap<br>• for any and all deployments in 5-8 year term | Government Contractor Defense (GCD)<br>• for any and all deployments in 5-8 years term |
| **Examples** | • EDS not yet TSL Certified<br>• Novel incident pattern matching service | • Radiological detector with laboratory success Opt-out screeners, only similar projects completed | • EDS TSL Certified<br>• Well-documented infrastructure protection service with history of excellent performance and meeting DoE standards |

EDS=Explosive Detection System TSL=Transportation Security Laboratory (TSA)

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*DHS SBIR expects to release its 6.2 SBIR Solicitation in August 2006*

*DHS announces its 6.1 SBIR/STTR award selections.....*

## Homeland Security Advanced Research Projects Agency SBIR/STTR Program

*Vision:* Make America Safer

*The top priority for everything HSARPA does is to enhance the safety and security of America's people, institutions and way of life.*

### *SBIR Program:*

The Department of Homeland Security (DHS), Homeland Security Advanced Research Projects Agency (HSARPA) launched the Small Business Innovation Research (SBIR) program, in December 2003. Our goal is to increase the participation of innovative and creative small businesses in Federal Research/Research and Development (R/R&D) programs and challenge industry to bring innovative homeland security solutions to reality.

All Federal agencies with an annual extramural R&D budget exceeding $100M are required to participate in the SBIR Program. Each fiscal year, not less than 2.5 percent of the annual extramural budget, is reserved for awards to small businesses for R/R&D through a three phase process

**Other Funding Opportunities**

**Collaboration Opportunities**

**Topic Recommendations**

Done

Internet

start Inbox ... C:\Doc... Micros... HSARP... Calcula... update... Micros... 5:07 PM

# Tech Clearinghouse Mission

To rapidly disseminate technical information concerning existing and desired products and services to/between Federal, State, Local, and Tribal Government and the Private Sector in order to encourage technological innovation and facilitate the mission of the Department of Homeland Security.

- Establishes Central Federal Technology Clearinghouse
- Issues Announcements for Innovative Solutions
- Establishes S&T Technical Assessment Team
- Provides guidance for the evaluation, purchase, and implementation of homeland security enhancing technologies
- Provides users with information to develop or deploy technologies that would enhance homeland security
- Enables technology transfer

**Improved Knowledge Sound Acquisition Decisions**

Homeland Security

# TechSolutions

## The mission of TechSolutions is to rapidly address technology gaps identified by Federal, State, Local, and Tribal first responders

- Field prototypical solutions in 12 months
- Cost should be commensurate with proposal but less than $1M per project
- Solution should meet 80% of identified requirements
- Provide a mechanism for Emergency Responders to relay their capability gaps
  - Capability gaps are gathered using a web site (www.dhs.gov/techsolutions)
- Gaps are addressed using existing technology, spiral development, and rapid prototyping
- Emergency Responders partner with DHS from start to finish

**Rapid Technology Development**

Target: Solutions Fielded within 1 year, at <$1M

Homeland Security

# TechSolutions Investments

Seatbelt Safety for Emergency Vehicles

Next Generation Breathing Apparatus

Fire Ground Compass

Under Consideration

Vehicle Mounted Chem/Bio Sensor Detection

Homeland Security

# Getting Involved: S&T Contacts

| Division | Email |
|---|---|
| Jim Tuttle | S&T-Explosives@dhs.gov |
| John Vitko | S&T-ChemBio@dhs.gov |
| David Boyd | S&T-C2I@dhs.gov |
| Dave Newton | S&T-BordersMaritime@dhs.gov |
| Sharla Rausch | S&T-HumanFactors@dhs.gov |
| Chris Doyle | S&T-InfrastructureGeophysical@dhs.gov |
| Bob Hooks | S&T-Transition@dhs.gov |
| Starnes Walker | S&T-Research@dhs.gov |
| Roger McGinnis | S&T-Innovation@dhs.gov |

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# Summary

**Detailed Requirements**

**Sizeable Market Potential**

**Delivered Products – PERIOD!**

**How Can You Afford NOT to Partner with DHS S&T?**

Questions/Comments:

Thomas A. Cellucci, Ph.D., MBA

thomas.cellucci@dhs.gov

Homeland Security

## Thomas A. Cellucci, PhD, MBA

Chief Commercialization Officer

Dr. Cellucci accepted a special five year appointment from the Department of Homeland Security in July 2007 as Chief Commercialization Officer for the Science and Technology (S&T) Directorate. The Chief Commercialization Officer (CCO) is responsible for initiatives that identify, evaluate and commercialize technology for the specific goal of rapidly developing and deploying products and services that meet the specific operational requirements of the Department of Homeland Security's Operating Components and its end users. The CCO also develops and drives the implementation of DHS-S&T's outreach with the private sector to establish and foster mutually-beneficial working relationships to facilitate cost-effective and efficient product/service development efforts.

Cellucci is an accomplished serial entrepreneur, seasoned senior executive and Board member possessing extensive corporate and VC experience across a number of worldwide industries. Profitably growing high technology firms at the start-up, mid-range and large corporate level has been his trademark. He also founded in 1999 a highly successful management consulting firm—Cellucci Associates, Inc. -- that raises capital and provides strategic business services to top-tier global high technology firms. He serves on both public and private Boards and has authored or co-authored over 120 articles on Nanotechnology, Laser physics, Photonics, Environmental disturbance control, MEMS test and measurement, Mistake-proofing enterprise software, and Sales & Marketing.

He has also held the rank of Lecturer or Professor at institutions like Princeton University, University of Pennsylvania and Camden Community College. Cellucci also co-authored ANSI Standard Z136.5 "The Safe Use of Lasers in Educational Institutions".

As a result of his consistent achievement in the commercialization of emerging technologies, Cellucci has received numerous awards and citations from industry, government and business. In addition, he has significant experience interacting with high ranking members of the United States government—including the White House, US Senate and US House of Representatives—having provided executive briefs to the President of the United States and ranking members of Congress.

Cellucci earned a PhD in Physical Chemistry from the University of Pennsylvania, an MBA from Rutgers University and a BS in Chemistry from Fordham University. He has also attended and lectured at executive programs at the Harvard Business School, MIT Sloan School, Kellogg School and others. Dr. Cellucci is regarded as an authority in rapid time-to-market new product development and is regularly asked to serve as keynote speaker at both business and technical events.

Homeland Security

Idaho National Laboratory

# The Future of Wireless and First Responders

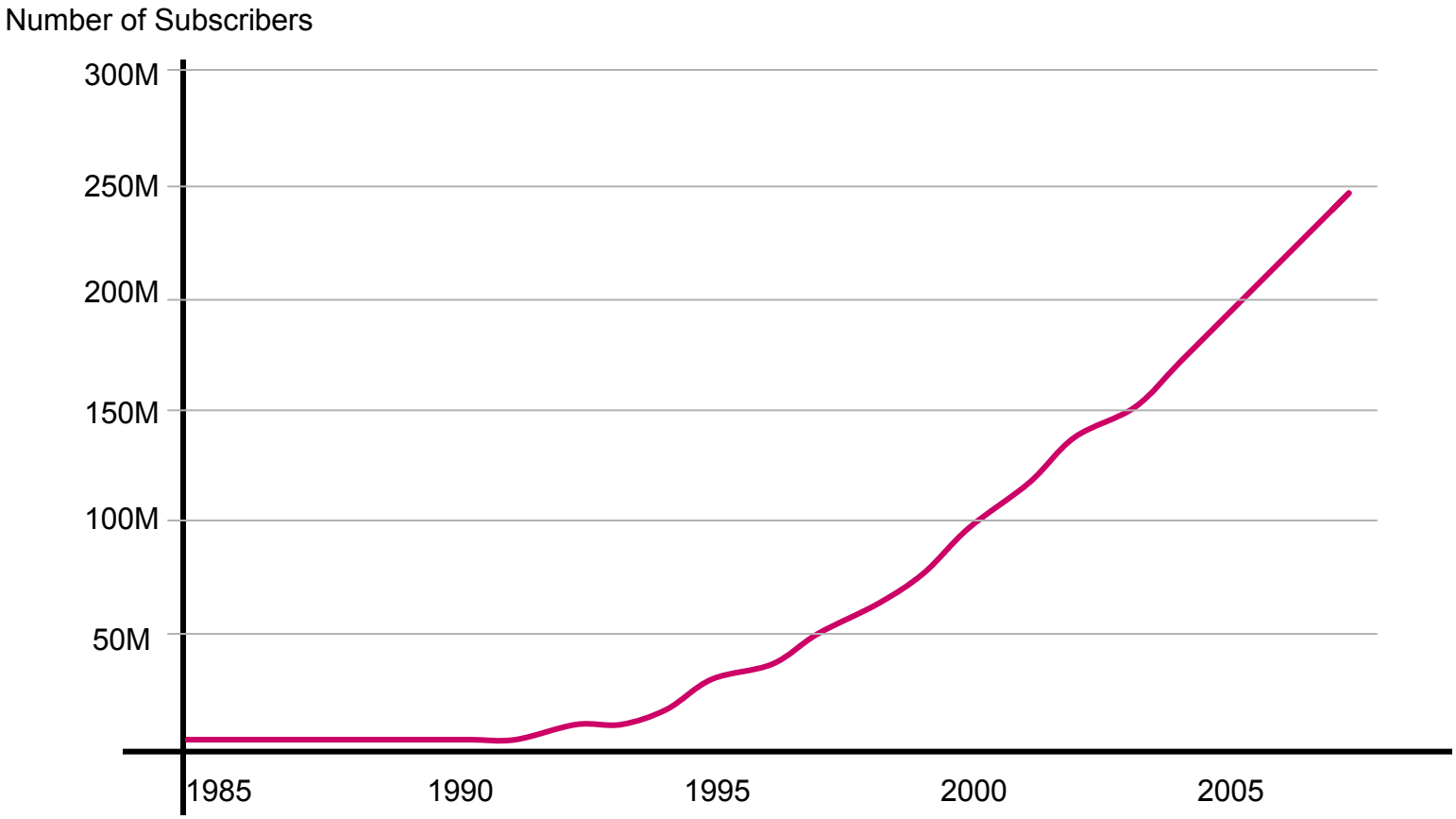
**Juan Deaton**
Cellular Systems Engineer
National and Homeland Security Directorate
Idaho National Lab
Phone: (208) 526-8589
Email: juan.deaton@inl.gov
Web: www.inl.gov

INL/CON-08-13699

# Wireless Technology and First Responder

- Wireless Past and Present
- Wireless Future
- First Responders and Wireless

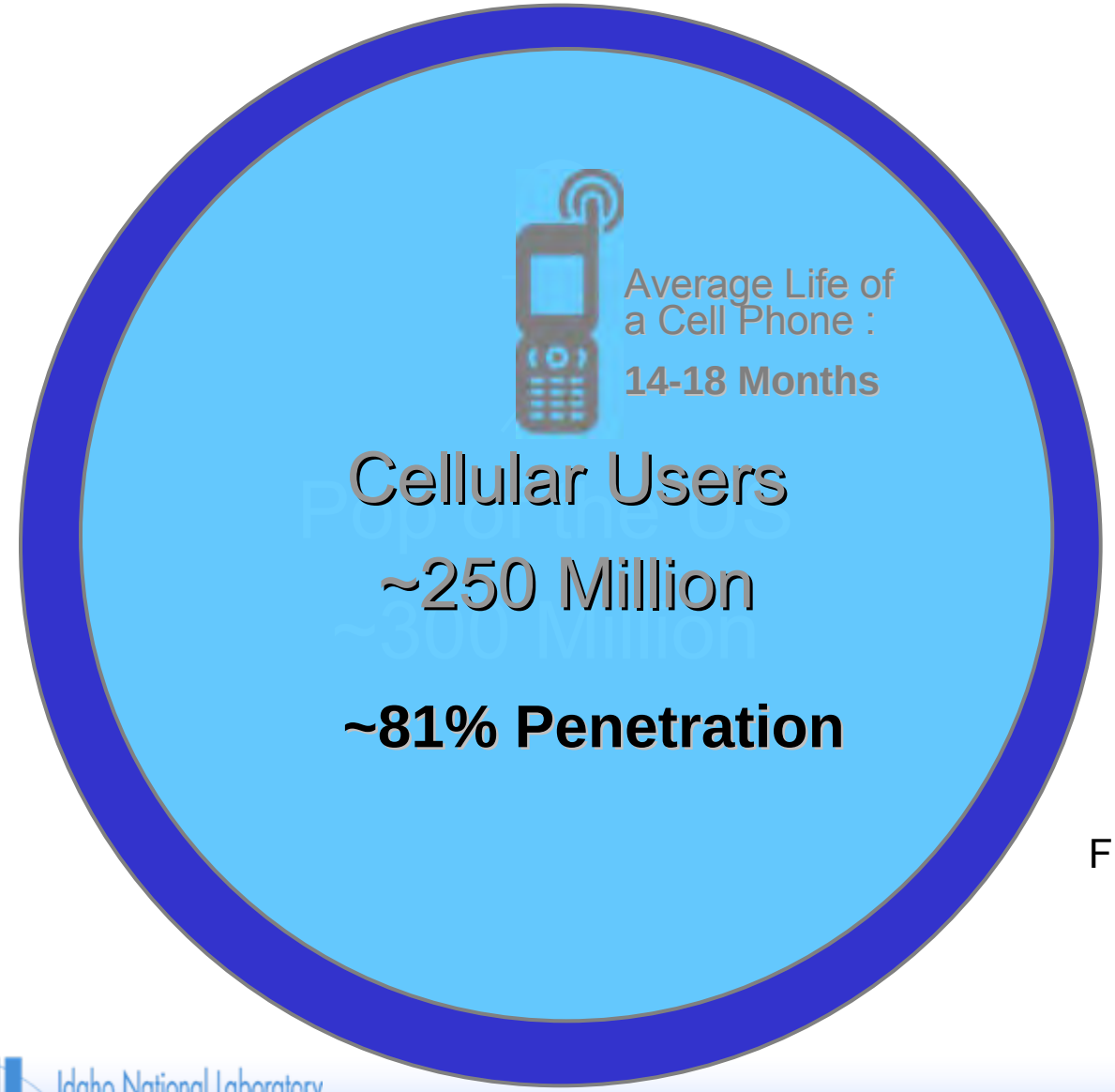
# Subscriber Growth




Idaho National Laboratory

*Source: CTIA*

# Cellular Statistics



Average Life of a Cell Phone :

**14-18 Months**

Cellular Users

~250 Million

**~81% Penetration**

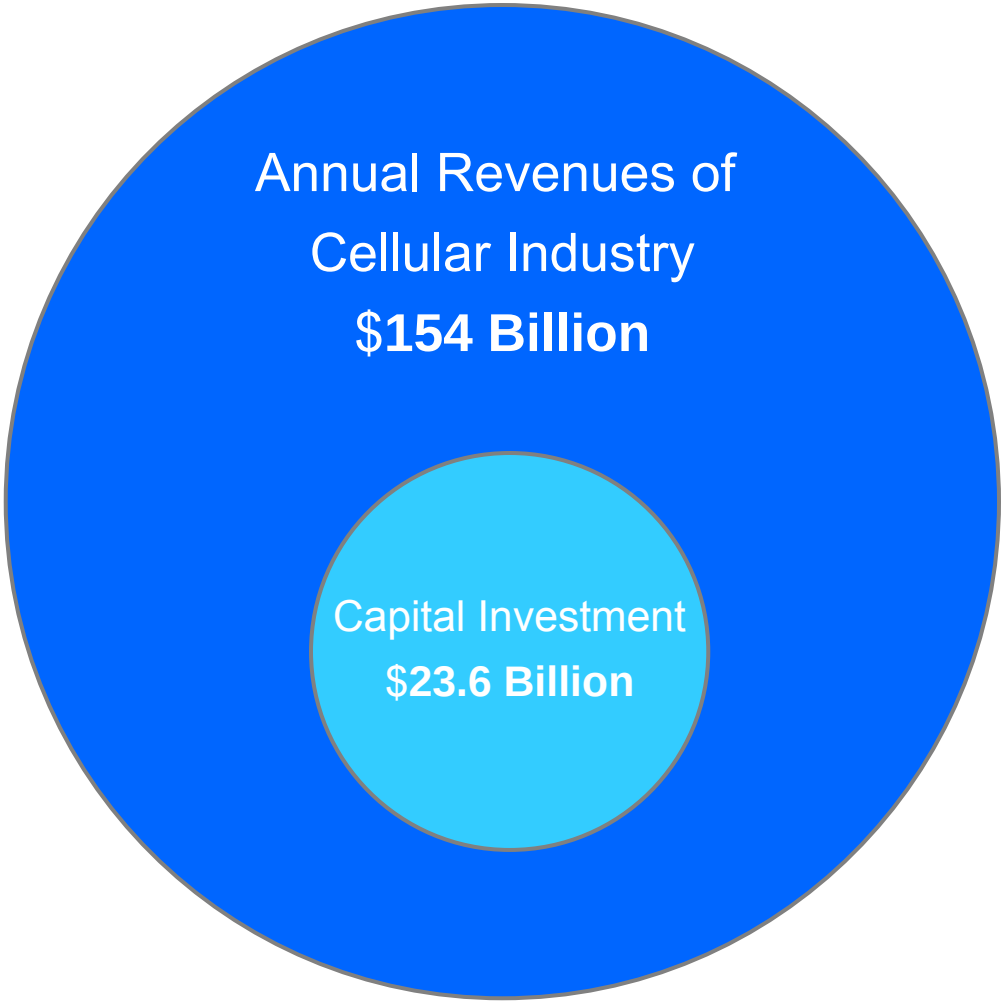
First Responders in US

~2.5 Million

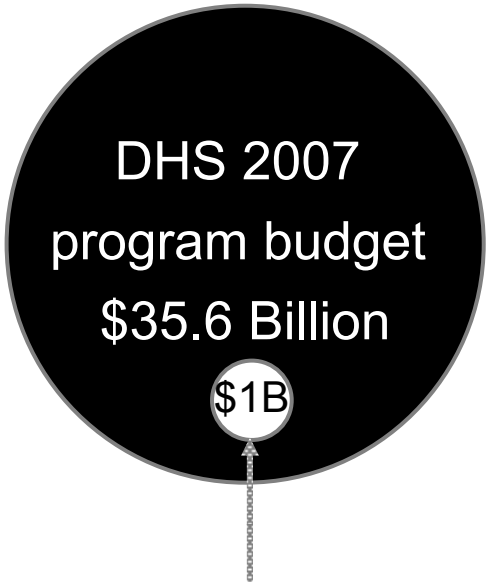


*Source: CTIA, WiFi Alliance*

# 2007 Financial Comparison



Public WiFi Annual Revenue

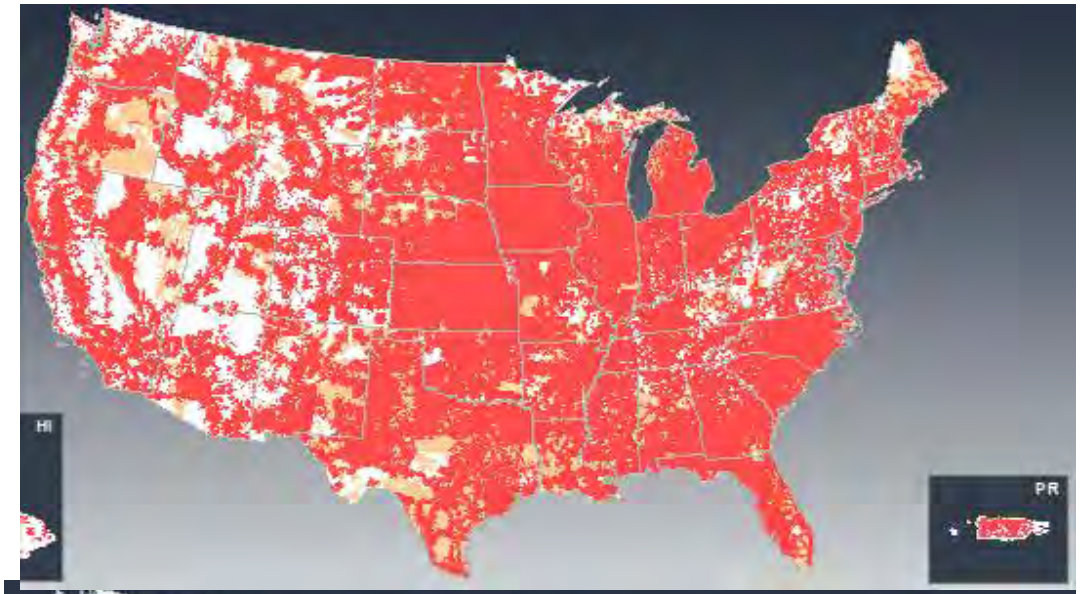



DHS Grants for Interoperability

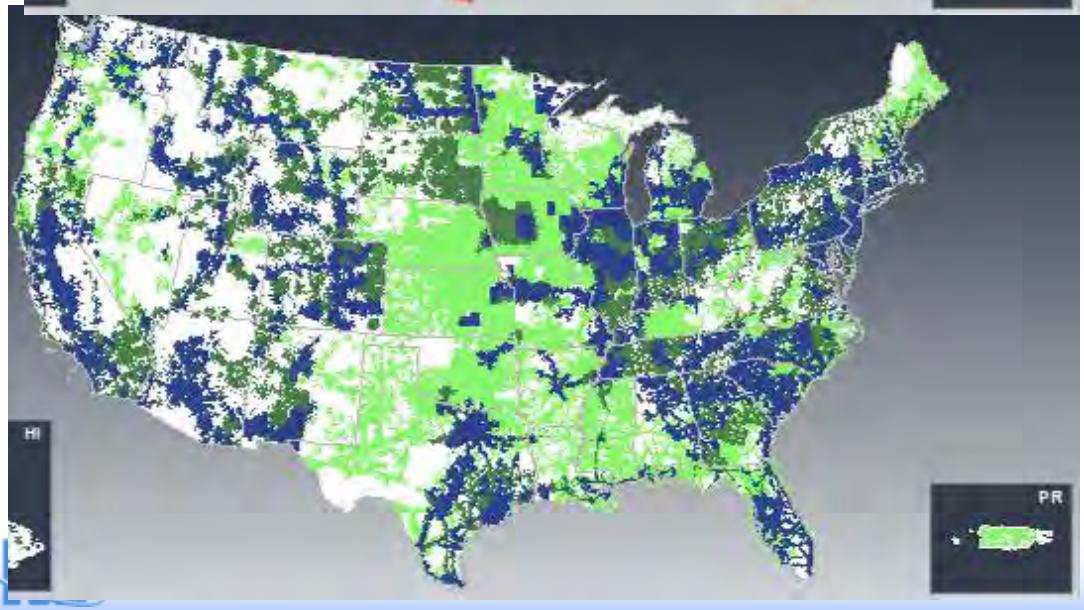
Idaho National Laboratory

*Source: CTIA, Homeland Defense Journal, WiFi Alliance*

# CDMA Cellular Coverage



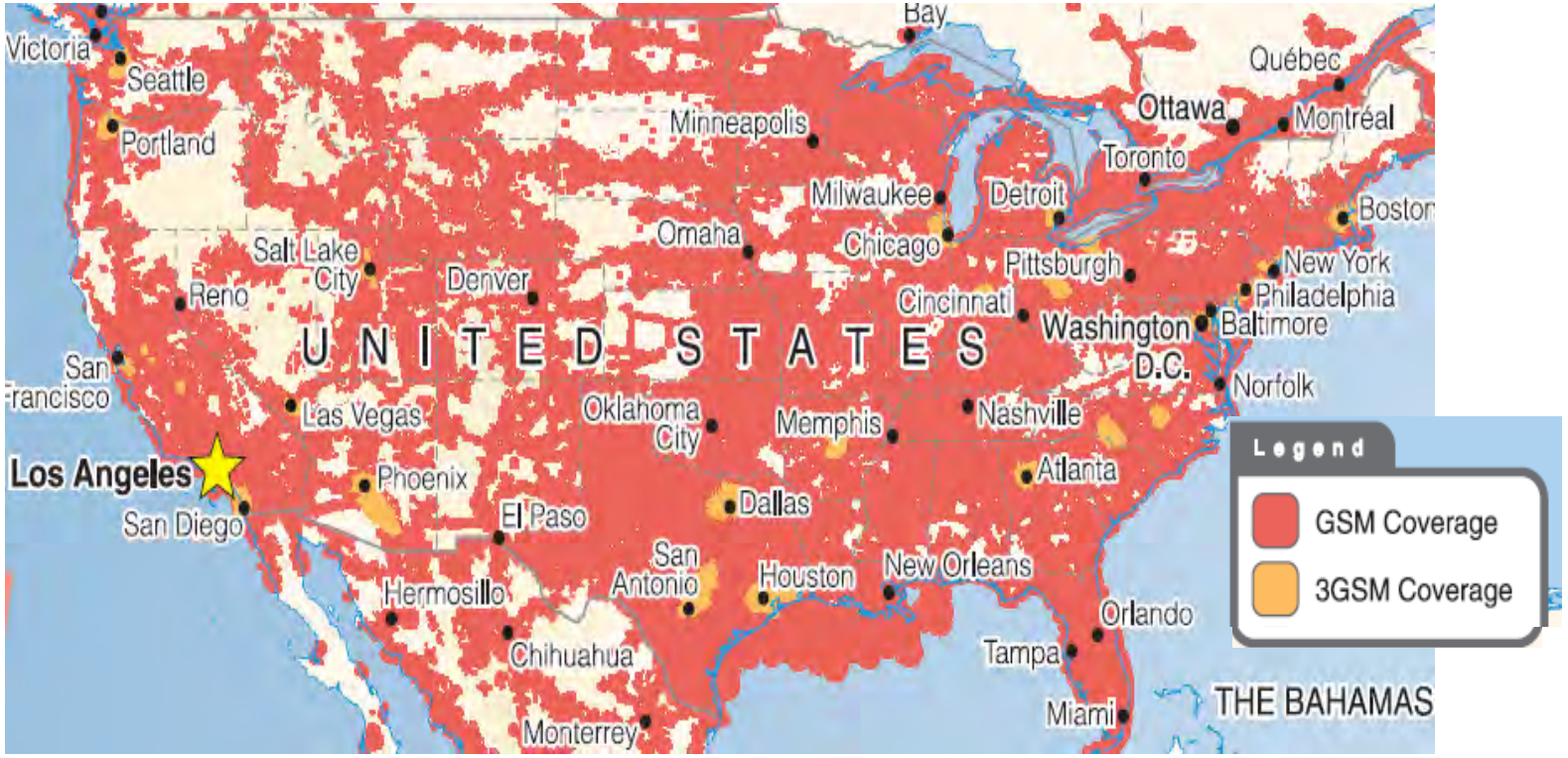

**Map Legend**
- Digital Coverage
- Analog Coverage
- No Coverage




**Map Legend**
- Broadband
- Enhanced Services
- Extended Enhanced Services
- No Coverage

*Source: Verizon Wireless*

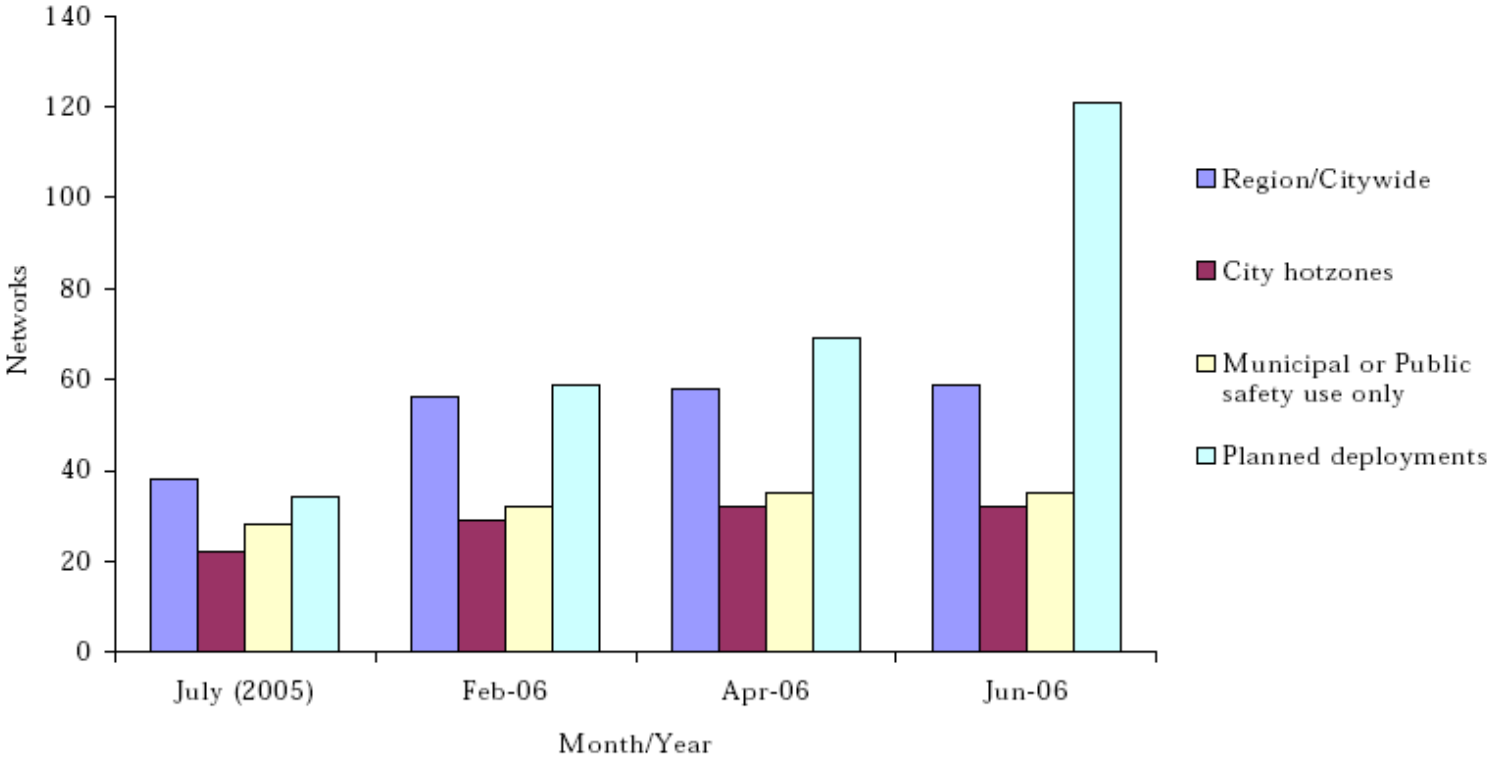
# GSM and 3G Coverage





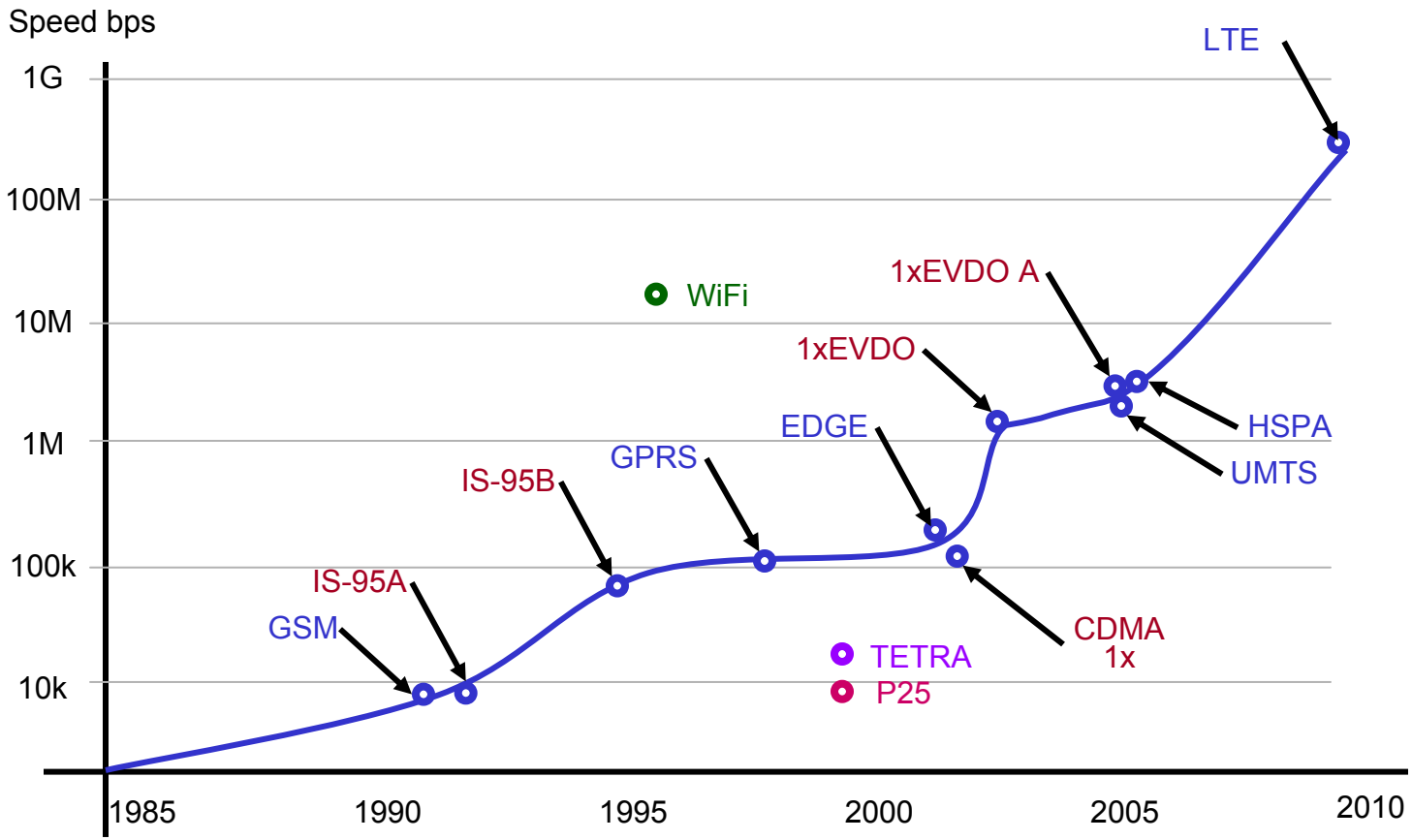

*Source: GSM Association*

# WiFi Coverage

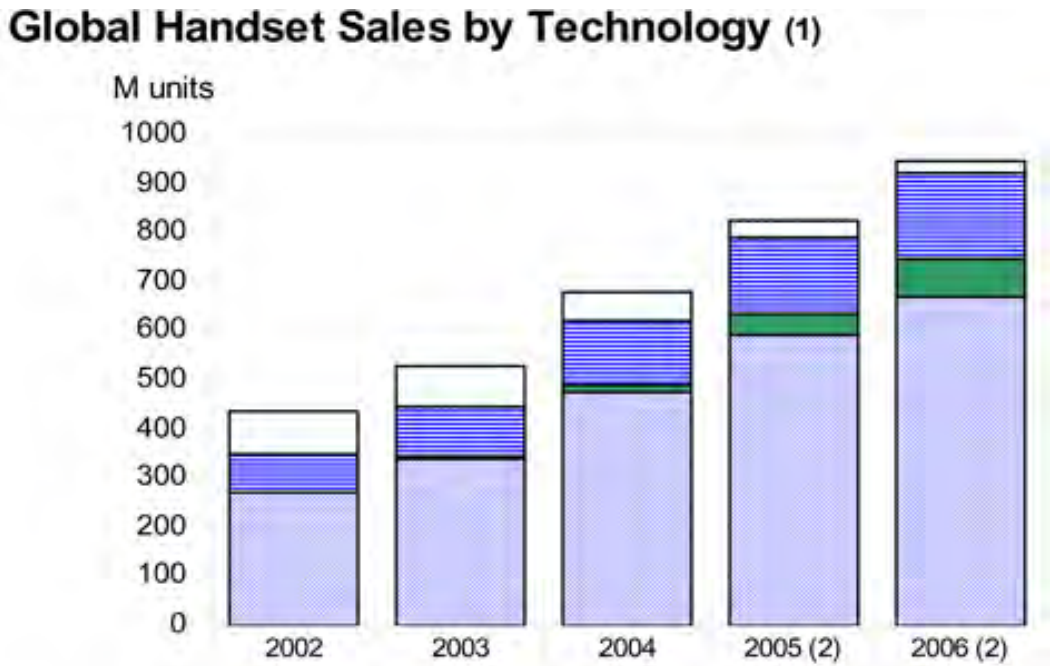



*Source: Frost & Sullivan*

# Data Rates Evolution



# Handset Sales

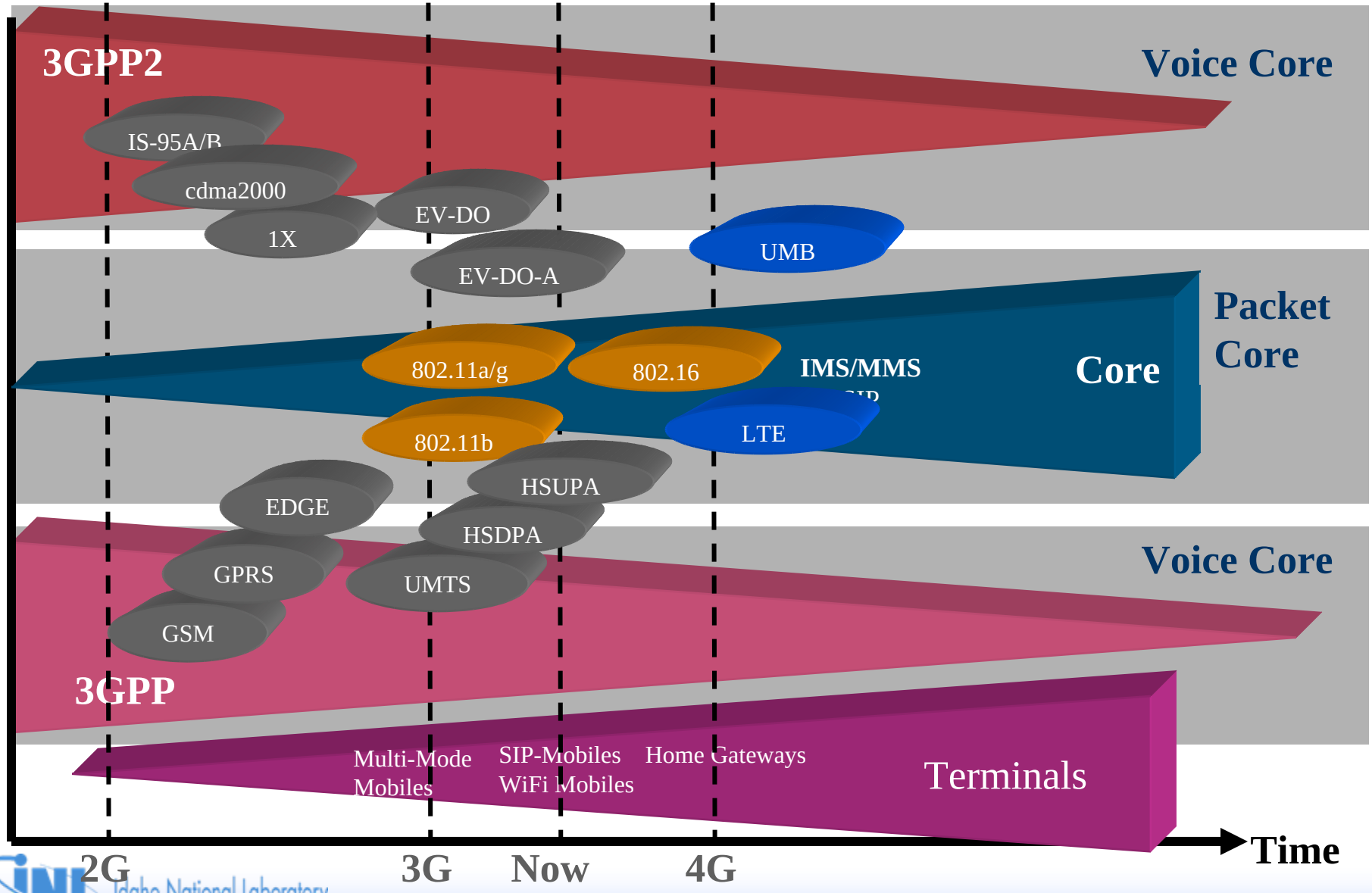



| | 2002 | 2003 | 2004 | 2005 (2) | 2006 (2) |
|---|---|---|---|---|---|
| Other (3) | 86 | 84 | 57 | 32 | 21 |
| CDMA One, CDMA2000 1x, 1xEV | 76 | 102 | 132 | 153 | 177 |
| WCDMA | 0 | 3 | 17 | 44 | 79 |
| GSM, GPRS, EDGE | 273 | 341 | 475 | 594 | 668 |
| Total Handsets | 435 | 530 | 681 | 823 | 945 |

Idaho National Laboratory

*Source: Strategy Analytics, Inc. - January 2006*

# Technology Families/Trends



# Major US Operators (October 2007)

| Operator | Technology | Subscribers (millions) |
|---|---|---|
| **AT&T** | HSDPA, UMTS, EDGE, GPRS, GSM, TDMA | 65.7 |
| **Verizon Wireless** | CDMA2000 1xEV-DO, CDMA2000 1x, CDMA | 63.7 |
| **Sprint Nextel**<br>Includes Sprint Network, Nextel Network, and Boost Mobile Prepaid | CDMA2000 1xEV-DO, CDMA2000 1x, CDMA (Sprint PCS), WiDEN, iDEN (Nextel) | 54.0 |
| **T-Mobile** | UMA, EDGE, GPRS, GSM | 26.9 |
| **Alltel** | CDMA2000 1xEV-DO, CDMA2000 1x, CDMA, AMPS | 12.447 |
| **TracFone**<br>Includes NET10 | GSM, CDMA, TDMA | 8.803 |
| **U.S. Cellular** | CDMA2000 1x, CDMA, TDMA | 6.010 |
| **Virgin Mobile** | CDMA2000 1xEV-DO, CDMA2000 1x, CDMA | 5.2 |
| **MetroPCS** | CDMA | 3.66 |



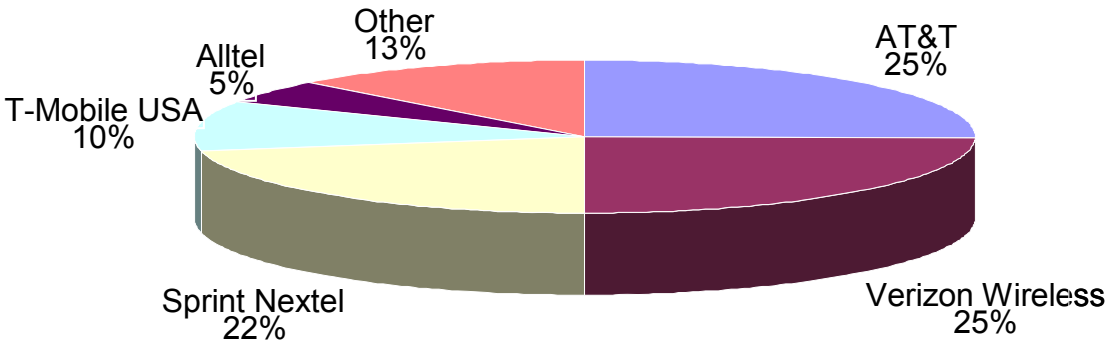
*Source: Operator Quarterly Reports*

# Wireless Technology and First Responder

- Wireless Past and Present
- Wireless Future
- First Responders and Wireless

# Operator Migrations

| Operator | Current Technology | Migrating to: |
|---|---|---|
| at&t | TDMA, GSM, GPRS, EDGE, UMTS, HSDPA | LTE |
| verizon wireless | IS-95, CDMA2000 1x, CDMA2000 1xEV-DO | LTE |
| Sprint | IS-95, CDMA2000 1x, CDMA2000 1xEV-DO<br>WiDEN, iDEN | WiMax |
| T··Mobile·· | GSM, GPRS, EDGE, WiFi | LTE ???? |
| alltel wireless | IS-95, CDMA2000 1xEV-DO | ???? |




Current Subscriber Market Share

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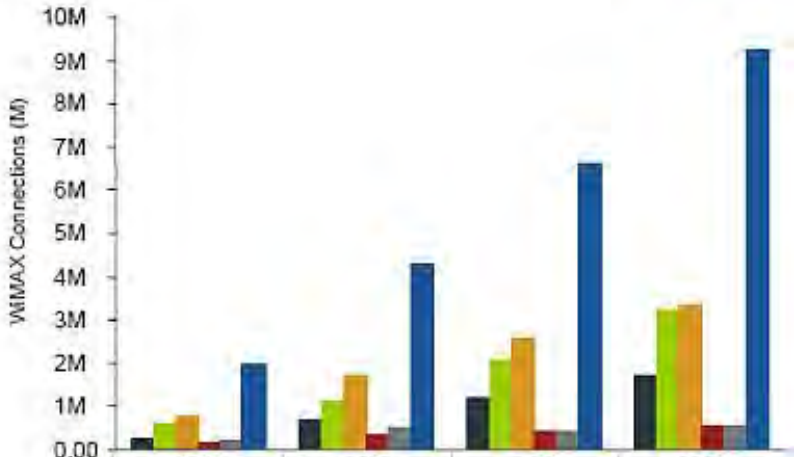
*Source: Carrier Press Releases*

# WiMax

Industry research analysts are bullish about prospects of WiMAX especially in Asia-Pacific and Europe

Derived from reports by:
Morgan Stanley
Gartner
Pyramid Research
iSuppli
IDC (chipset viewpoint)
Maravedis (09.2006)




| | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| North America | 0.25 | 0.69 | 1.18 | 1.73 |
| Europe | 0.60 | 1.09 | 2.07 | 3.19 |
| APAC | 0.76 | 1.72 | 2.55 | 3.32 |
| Latin America | 0.16 | 0.33 | 0.41 | 0.52 |
| Middle East and Africa | 0.20 | 0.47 | 0.41 | 0.52 |
| Average connections (MM) | 1.95 | 4.29 | 6.62 | 9.28 |

XOHM

MOTOROLA intel SAMSUNG Nokia Siemens Networks

Google ERICSSON ZyXEL NOKIA Connecting People

ZTE中兴 Alcatel·Lucent

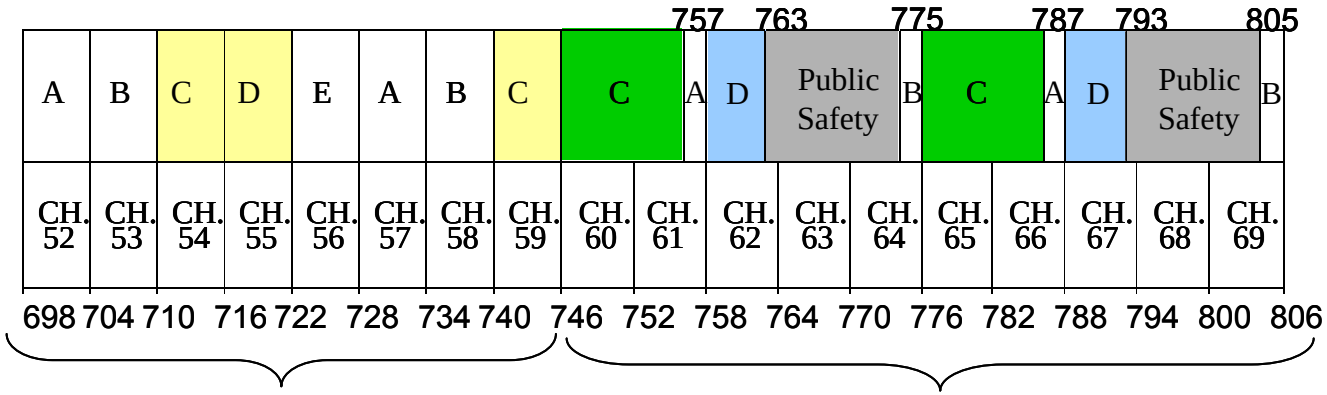
clearwire

**258,000 Subscribers**

Idaho National Laboratory

*Source: Sprint, Clearwire and Analysts*

# 700 MHz Auction




| Block | Frequencies | Bandwidth | Pairing | Area Type | Licenses |
|---|---|---|---|---|---|
| A | 698-704, 728-734 | 12 MHz | 2 x 6 MHz | EA | 176 |
| B | 704-710, 734-740 | 12 MHz | 2 x 6 MHz | CMA | 734 |
| C | 710-716, 740-746 | 12 MHz | 2 x 6 MHz | CMA | 734* |
| D | 716-722 | 6 MHz | unpaired | EAG | 6* |
| E | 722-728 | 6 MHz | unpaired | EA | 176 |
| C | 746-757, 776-787 | 22 MHz | 2 x 11 MHz | REAG | 12 |
| D | 758-763, 788-793 | 10 MHz | 2 x 5 MHz | Nationwide | 1** |
| A | 757-758, 787-788 | 2 MHz | 2 x 1 MHz | MEA | 52*** |
| B | 775-776, 805-806 | 2 MHz | 2 x 1 MHz | MEA | 52*** |

*Blocks have been auctioned.

**Block is associated with the 700 MHz Public/Private Partnership

***Guard Bands blocks have been auctioned, but are being relocated



*Source: FCC*

# 700 MHz Major players

- C Block

- D Block

- What will 700 MHz Technologies be?
  - Likely LTE if cellular providers win
  - If Google Wins, WiMax?



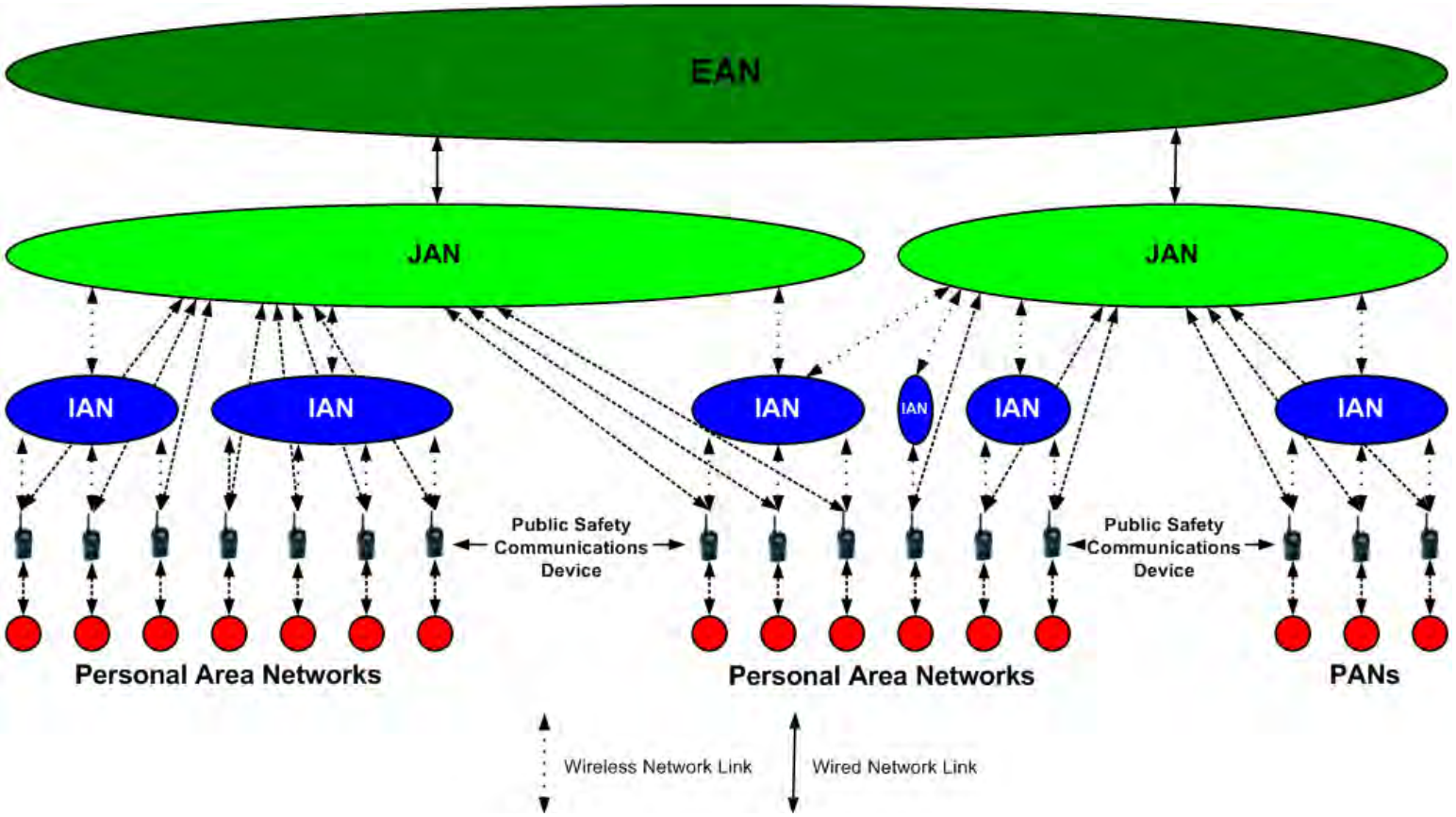
*Source: RCR Wireless*

# Wireless Technology and First Responder

- Wireless Past and Present
- Wireless Future
- First Responders and Wireless

# System of Systems

EAN: Extended Area Network
JAN: Jurisdictional Area Network
IAN: Incident Area Network
PAN: Personal Area Network

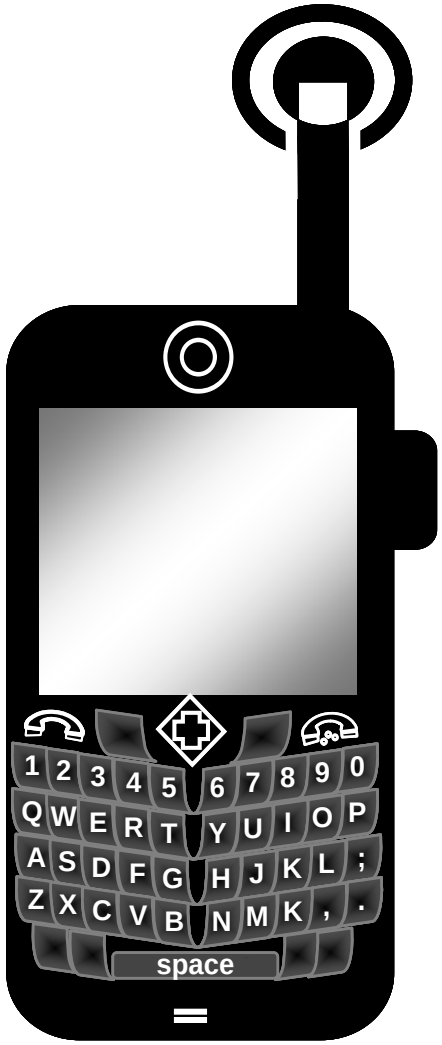



Idaho National Laboratory

*Source: SAFECOM SoR v1.1*

# Public Safety Communications Device

- **Interface capability**
  - Qwerty Keyboard, real or virtual
  - Camera
  - Adequate Screen Size
  - Stylus/Touch Screen
- **Wireless Capabilities**
  - Wireless Broadband (3G or 4G)
  - WiFi
  - Bluetooth
  - GPS Receiver
- **Estimated Future Expected Cost***
  - ~$500 Device
  - ~$50-$100 Monthly Service/Device

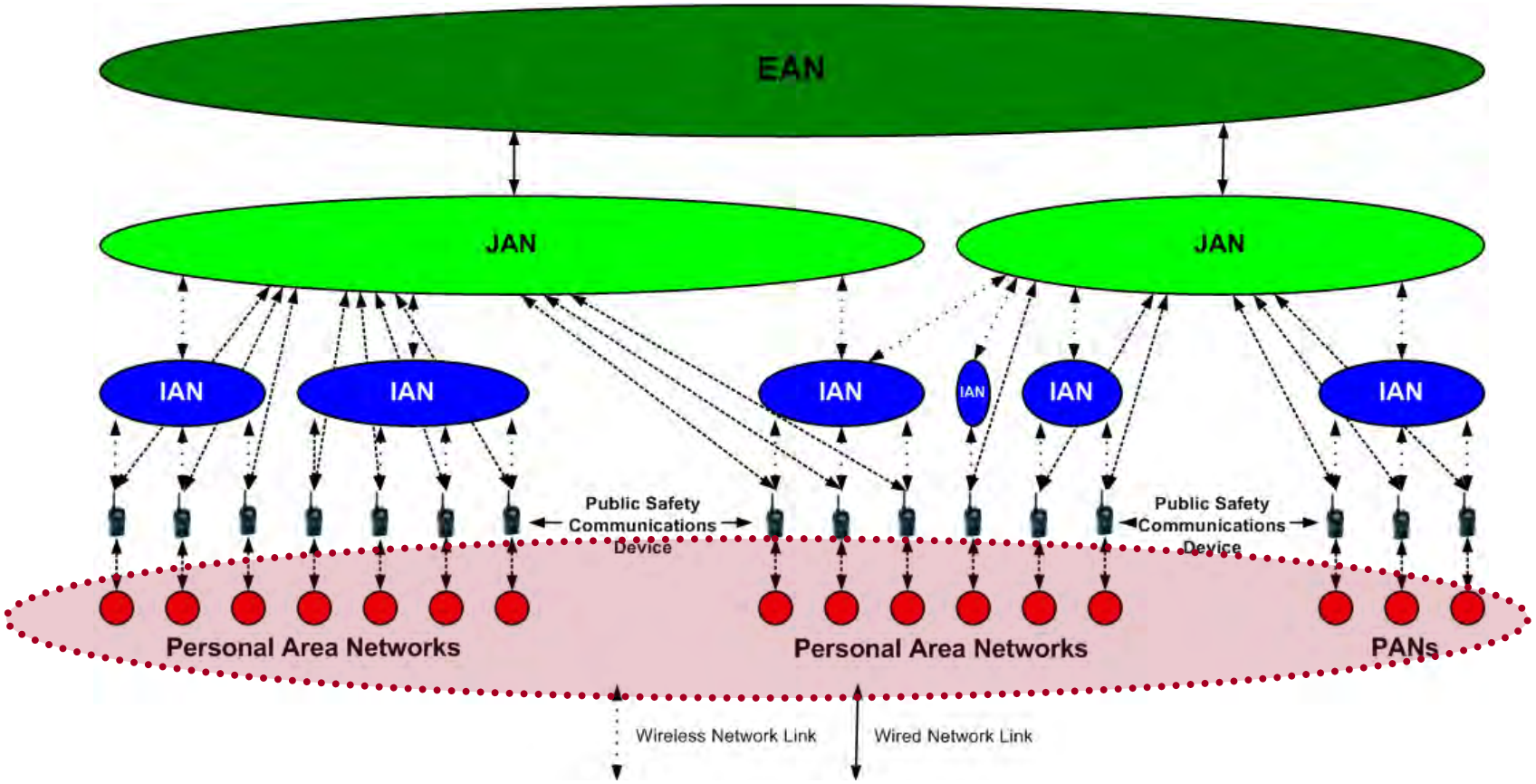





**Based on current services and estimates for additional services*

# System of Systems

EAN: Extended Area Network
JAN: Jurisdictional Area Network
IAN: Incident Area Network
PAN: Personal Area Network



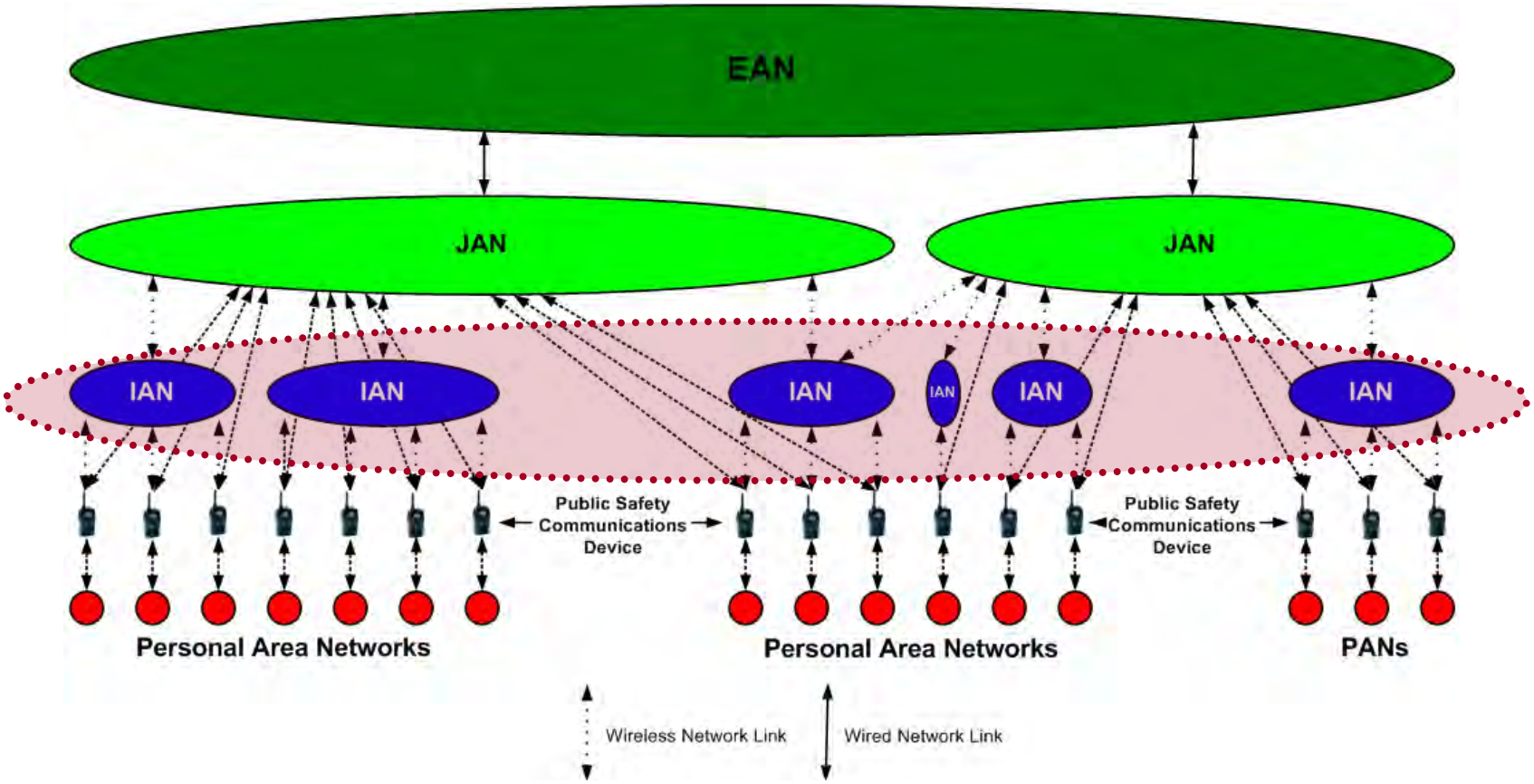

Idaho National Laboratory

*Source: SAFECOM SoR v1.1*

# Personal Area Networks (PAN)

# System of Systems

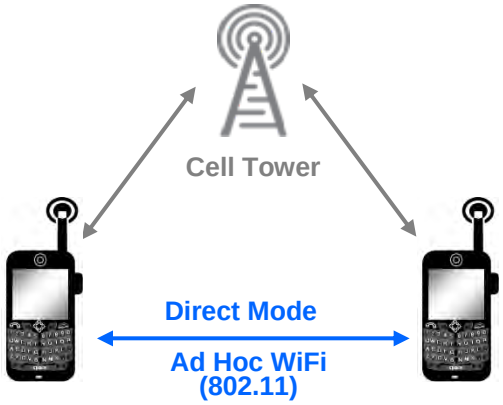
EAN: Extended Area Network
JAN: Jurisdictional Area Network
IAN: Incident Area Network
PAN: Personal Area Network



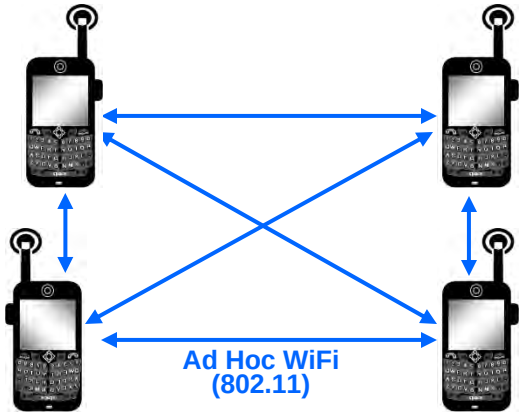

Idaho National Laboratory

*Source: SAFECOM SoR v1.1*

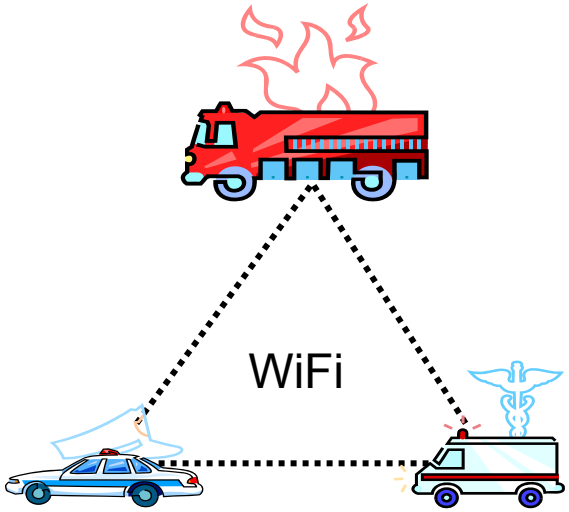
# Incident Area Communications




**Dual Mode Device Capabilities**



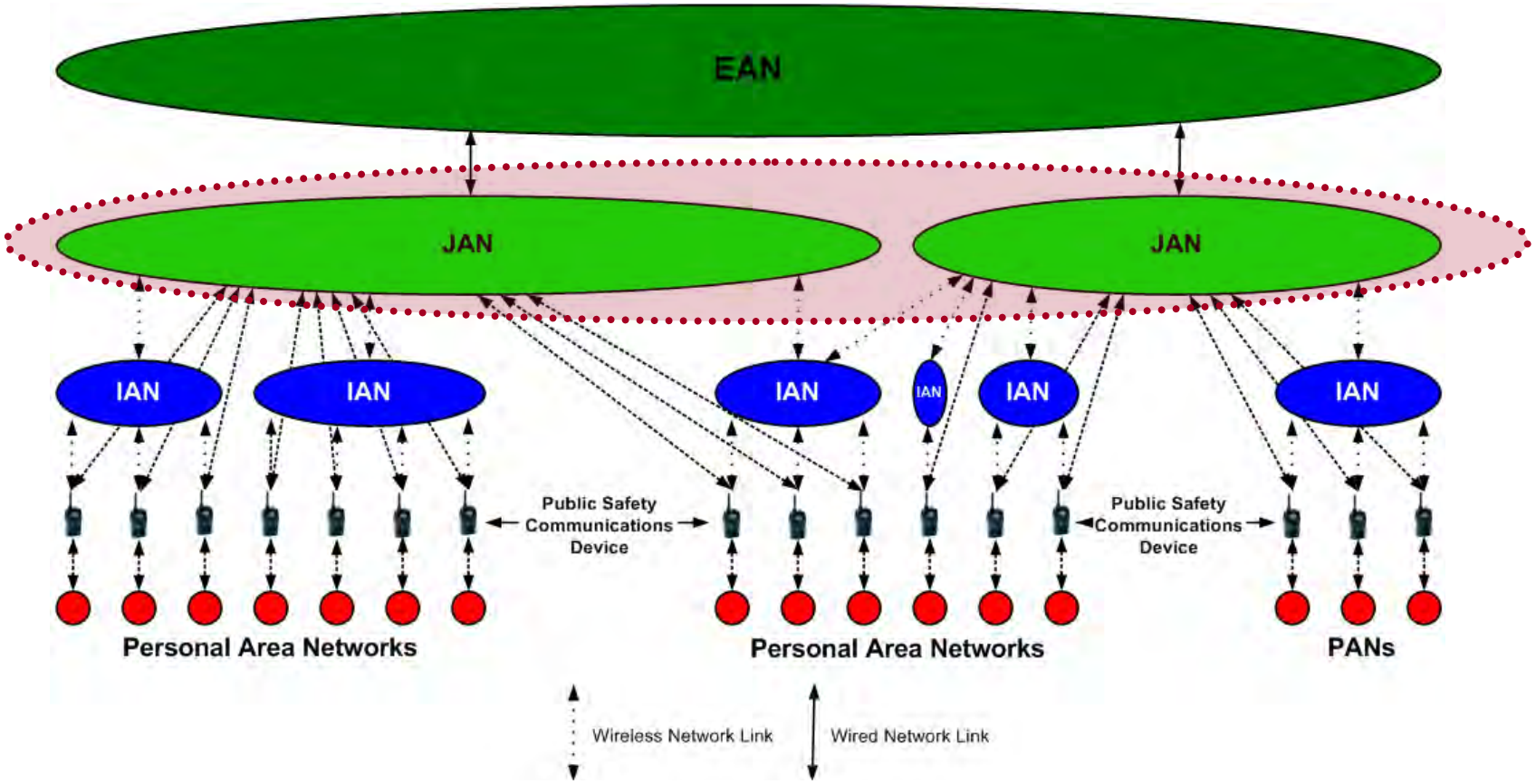

**PTT Ad Hoc Network**




Mobile Ad Hoc Network (MANET)

# System of Systems

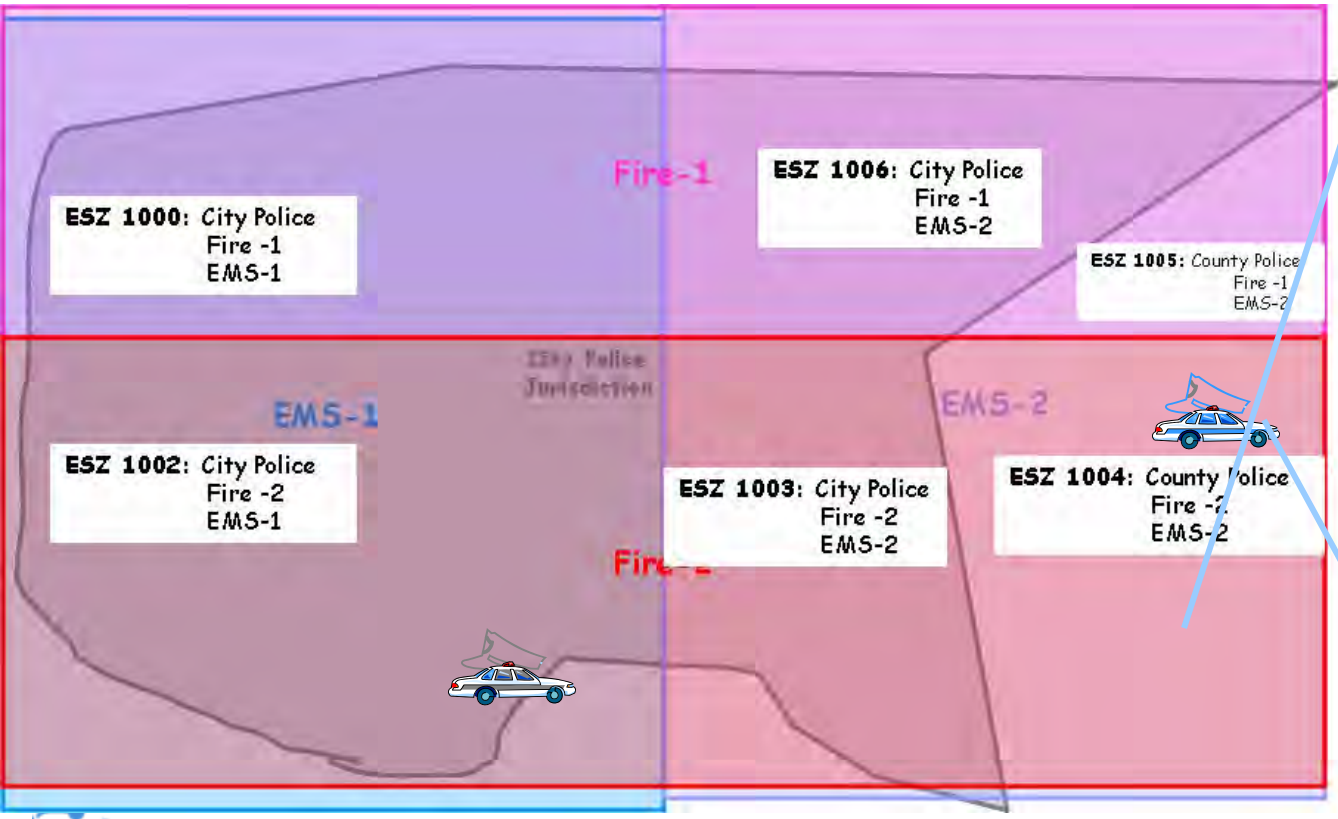
EAN: Extended Area Network
JAN: Jurisdictional Area Network
IAN: Incident Area Network
PAN: Personal Area Network




Idaho National Laboratory

*Source: SAFECOM SoR v1.1*

# Jurisdictional Area Networks




**Static Nets**
- City Police
- Fire-2
- EMS-1

**Local Nets**
- County Police
- Fire-2
- EMS-2

CITY POLICE

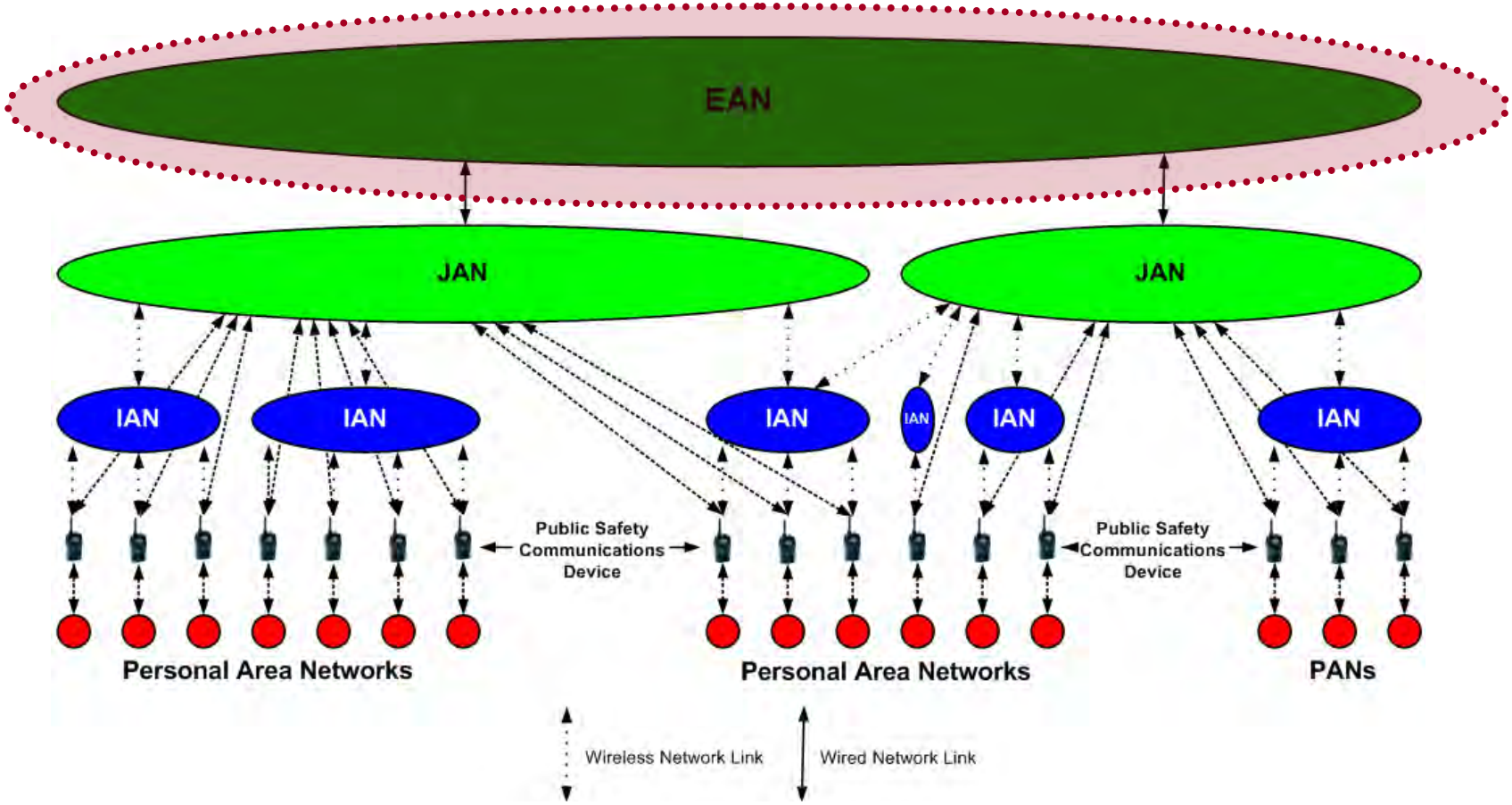
**Static Nets**
- County Police

**Visiting Nets**
- City Police

COUNTY POLICE

# System of Systems

EAN: Extended Area Network
JAN: Jurisdictional Area Network
IAN: Incident Area Network
PAN: Personal Area Network

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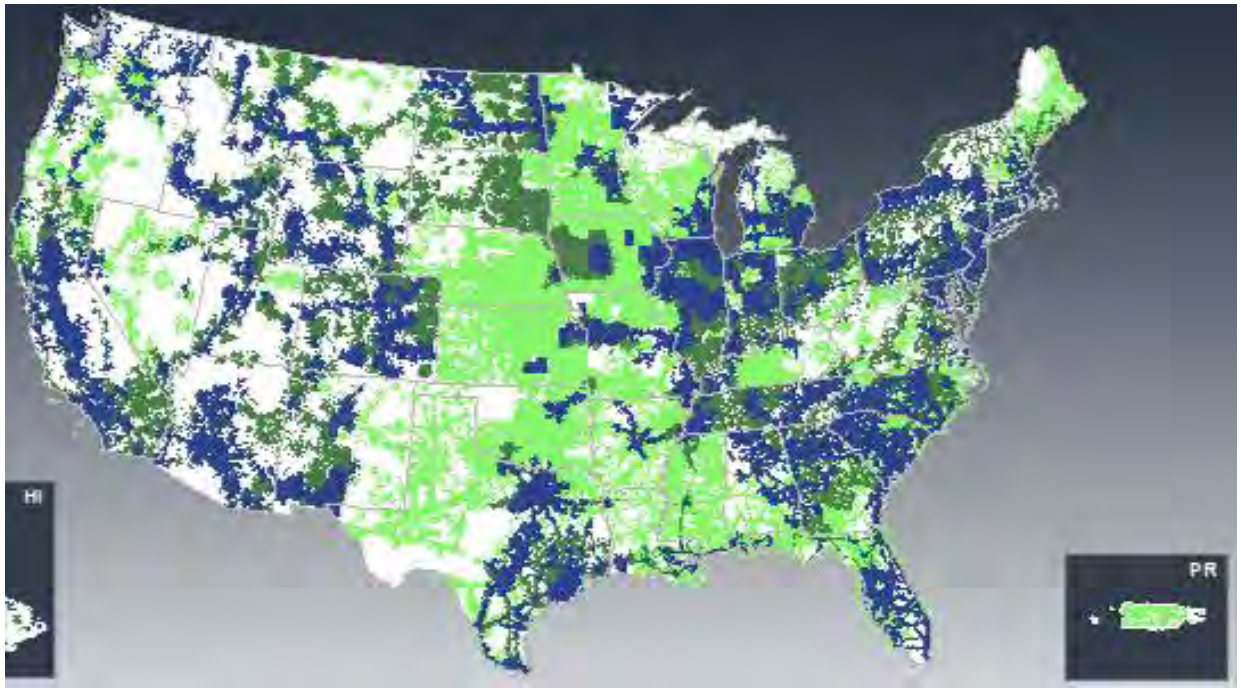
*Source: SAFECOM SoR v1.1*

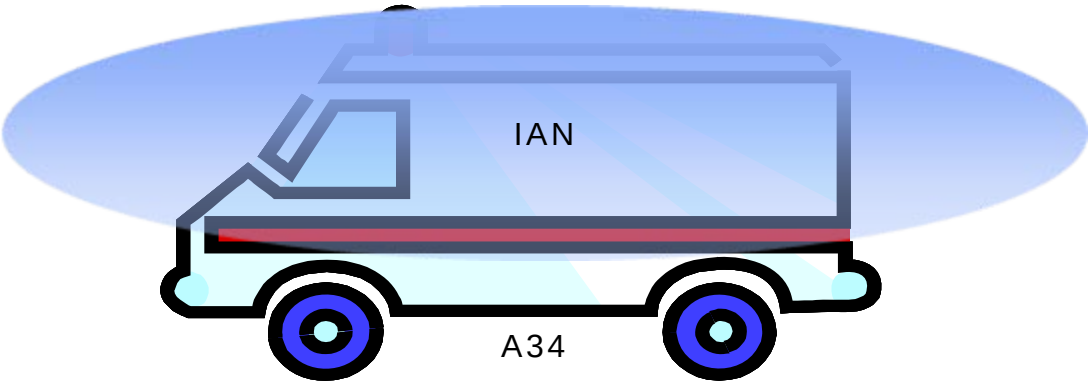
# Extended Area Network

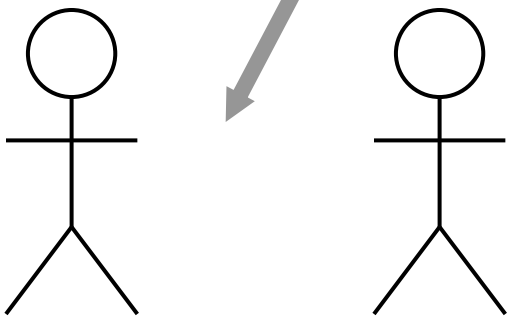


# Basic Services you should expect

| Service | Description |
|---|---|
| Push to Talk Voice | Common Net Traffic used in current LMR Systems |
| Status Data | Periodic updates to centeralized data base for biometrics, GPS Location Info, Equipment Data |
| Instant Messaging | Text Messages between responders |
| Streaming Video/Data | Still pictures or real streaming video. Real time biometric data feed. |
| E-mail | E-Mail w/ Attachments |
| Web Browsing | Access to Maps, Geolocation Data, Building Layouts, Medical and Criminal information |
| Full Duplex Voice | PSTN Phone Call |

# EMS Scenario





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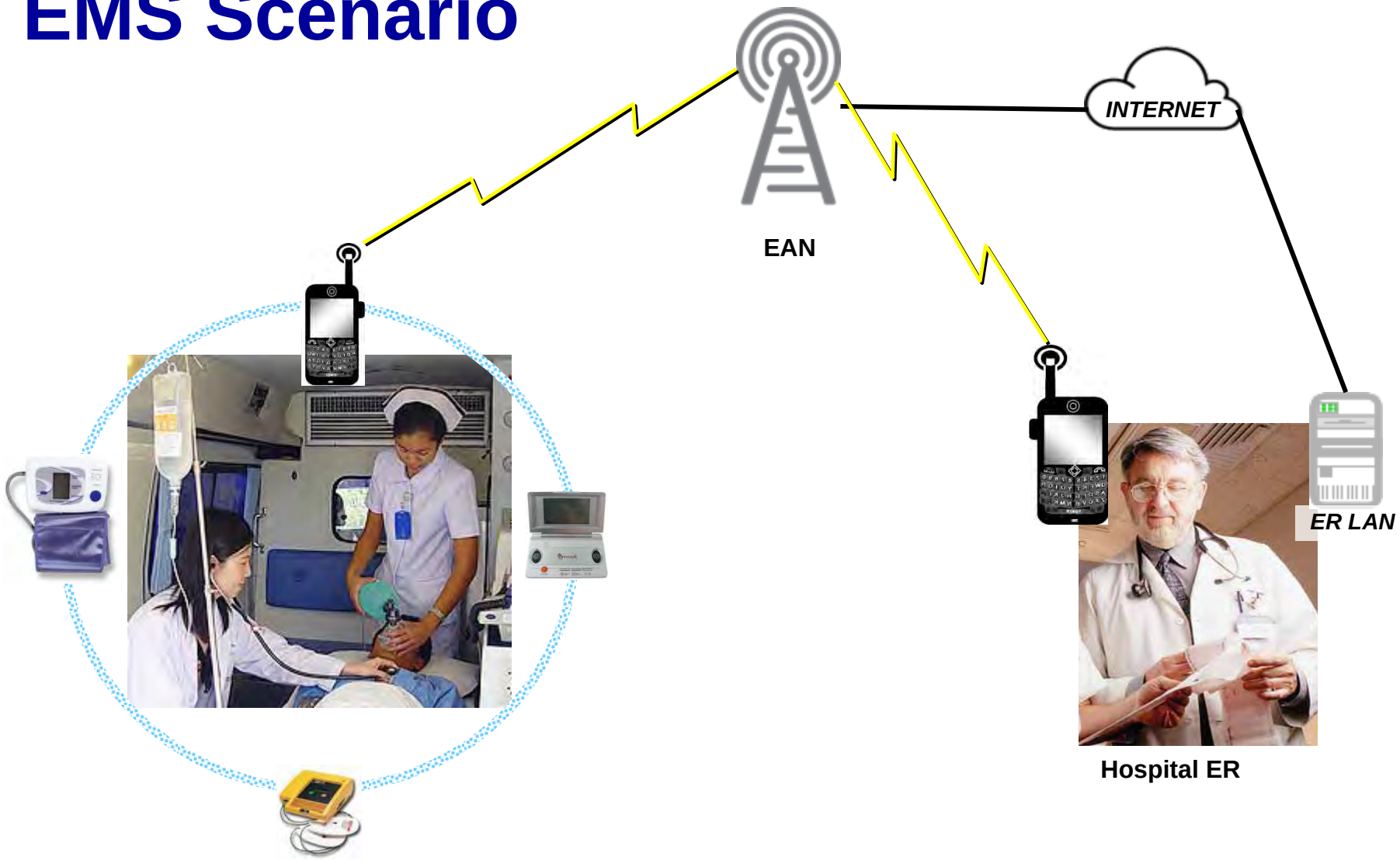
# EMS Scenario

# EMS Scenario

# EMS Scenario



# New Technology Concerns

- **Growing Pains**
  - Training, Initial Deployments
- **Costs vs. Benefits**
  - How will the costs be different?
  - What benefits will be provided me?
- **Service Provider?**
  - Full Package = Devices + Network + Host Based Services

# Summary and Conculsions

- **Wireless Past and Present**
  - Size Matters
- **Wireless Future**
  - Major LTE deployments
  - Niche Markets for WiMax
- **First Responders and Wireless**
  - PANs, IANs, JANs, EANs

SAN DIEGO STATE UNIVERSITY

# Homeland Security Master's Program

**January 14, 2008**
**DHS S&T Conference**

SAN DIEGO STATE UNIVERSITY
Viz Center
Center for Information Technology and Infrastructure,
Homeland Security Master's Program,
Center for Homeland Security Technology Assessment
SDSU SAN DIEGO STATE UNIVERSITY
Bob Welty
Eric Frost
http://citi.sdsu.edu
Jeff McIllwain

# SDSU Visualization Center

## Example of Data Fusion for Making Decisions

Sensor Networks, Wireless / Optical Communications, Remote Sensing, Imaging, Data Fusion, Data Visualization, and Decision Support

# Homeland Security Master's Program

Two Co-Directors, Eric Frost and Jeff McIllwain for academic program tied to Homeland Security research effort, Co-Directed by Eric Frost and Bob Welty.

Started in 2004 as Interdisciplinary Studies: Homeland Security major, blossomed into fully standalone program, entitled simply "Homeland Security Master's Program"

36 units, 4 core classes, strongly interdisciplinary, primary motivation for students is Public Service

# Homeland Security Master's Program

Spring, 2008, approximately 130 graduate students, including from FBI, TSA, Federal Air Marshals, Border Patrol, Fire, Law Enforcement, industry, Public Health, Coast Guard, Army, Navy, Marines, students

Approximately 40 Faculty from across the University, including Physics, Chemistry, Information and Decision Systems (Business), Geography, Religious Studies, Life Sciences, Tourism, Criminal Justice, Languages, Communications, Public Health, and numerous others.

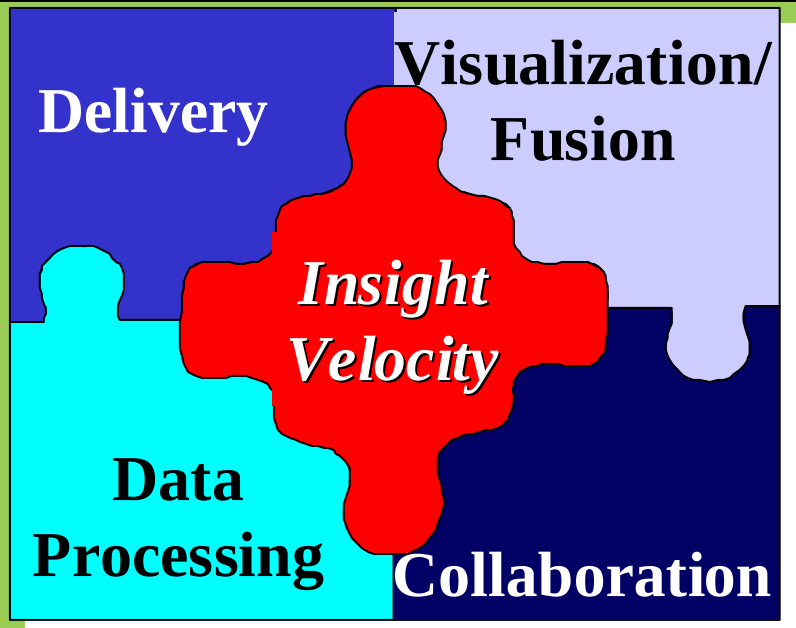
# Homeland Security Master's Program

Four Core Classes:

- Introduction to Homeland Security
- Science and Technology in Homeland Security
- Emergency Management in Homeland Security
- Law and Ethics in Homeland Security
- Critical Infrastructure Protection, Terrorism and Counter-terrorism, Transnational Crime, GIS and Imaging, Information and Decision Systems, Chemistry and Physics Imaging, Study Abroad, and classes in several dozen departments

# Insight Velocity---Connecting Technology and Policy for Homeland Security

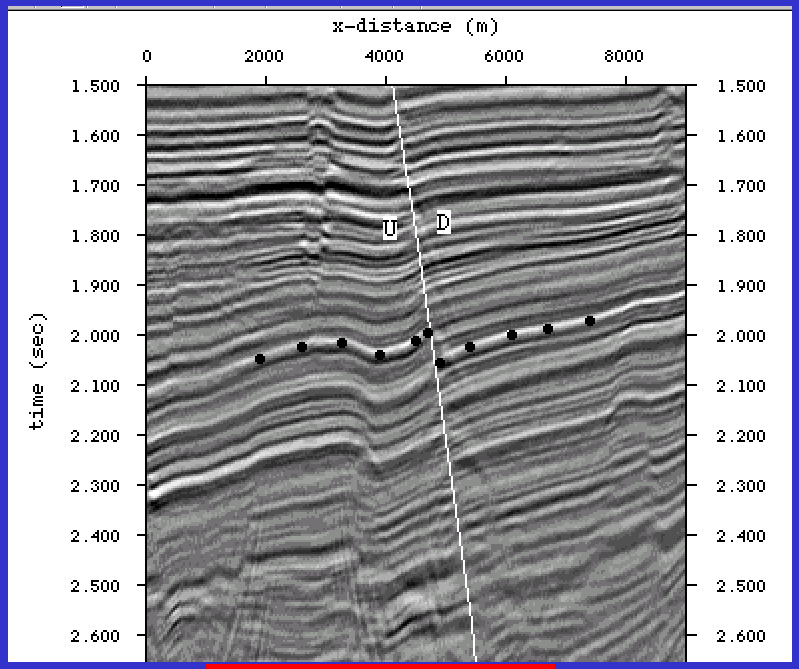
The Gating Factor to Improved Operational Efficiency and Financial Performance is ***the Rate at which Information is Consumed and Transformed into Knowledge and Action = Expert Bandwidth!***

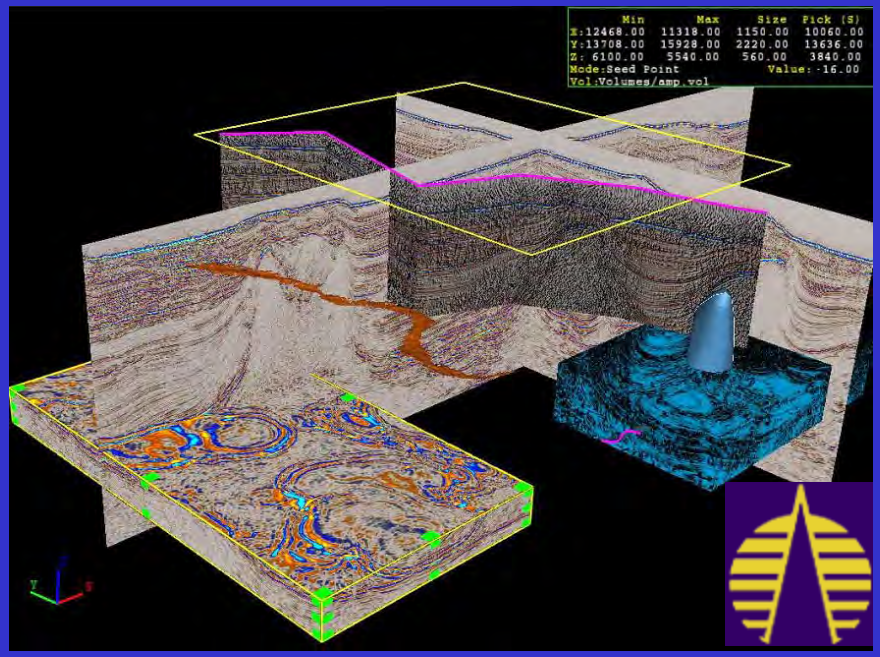



***Scenario***

| | |
|---|---|
| √ Capital | *Plenty* |
| √ Opportunities | *Plentiful but Immature* |
| √ People | *Bandwidth* ***Limited*** |

# Delivering Data and Voice and Location Globally, Homeland Security Real Training



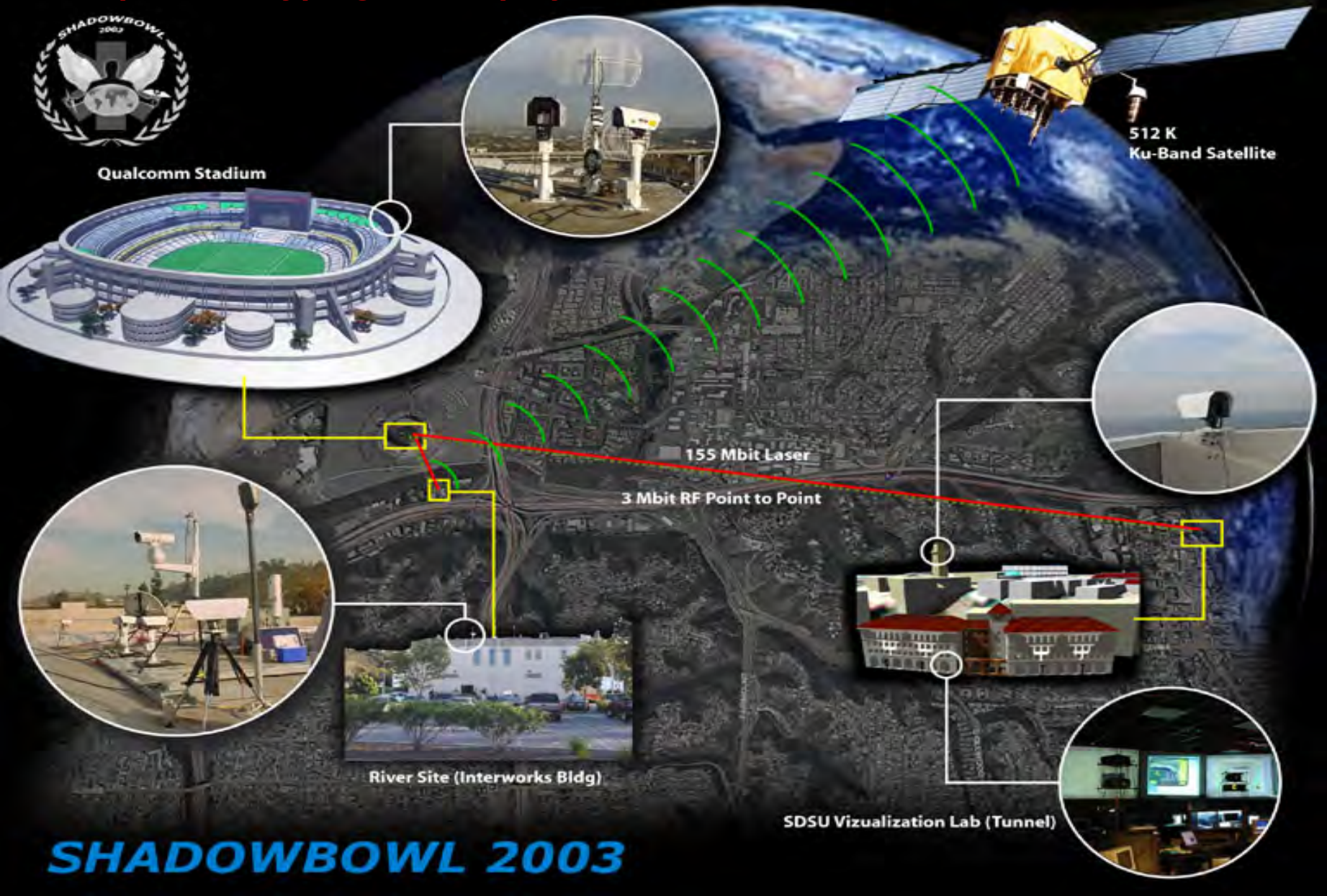

**1993**
100- MB
10% viewed
2-3 maps
12 months
***800KB/month***

***400,000 fold productivity improvement***

**2004**
400+ GB
100% viewed
Volumes
1 month
***400GB/month***

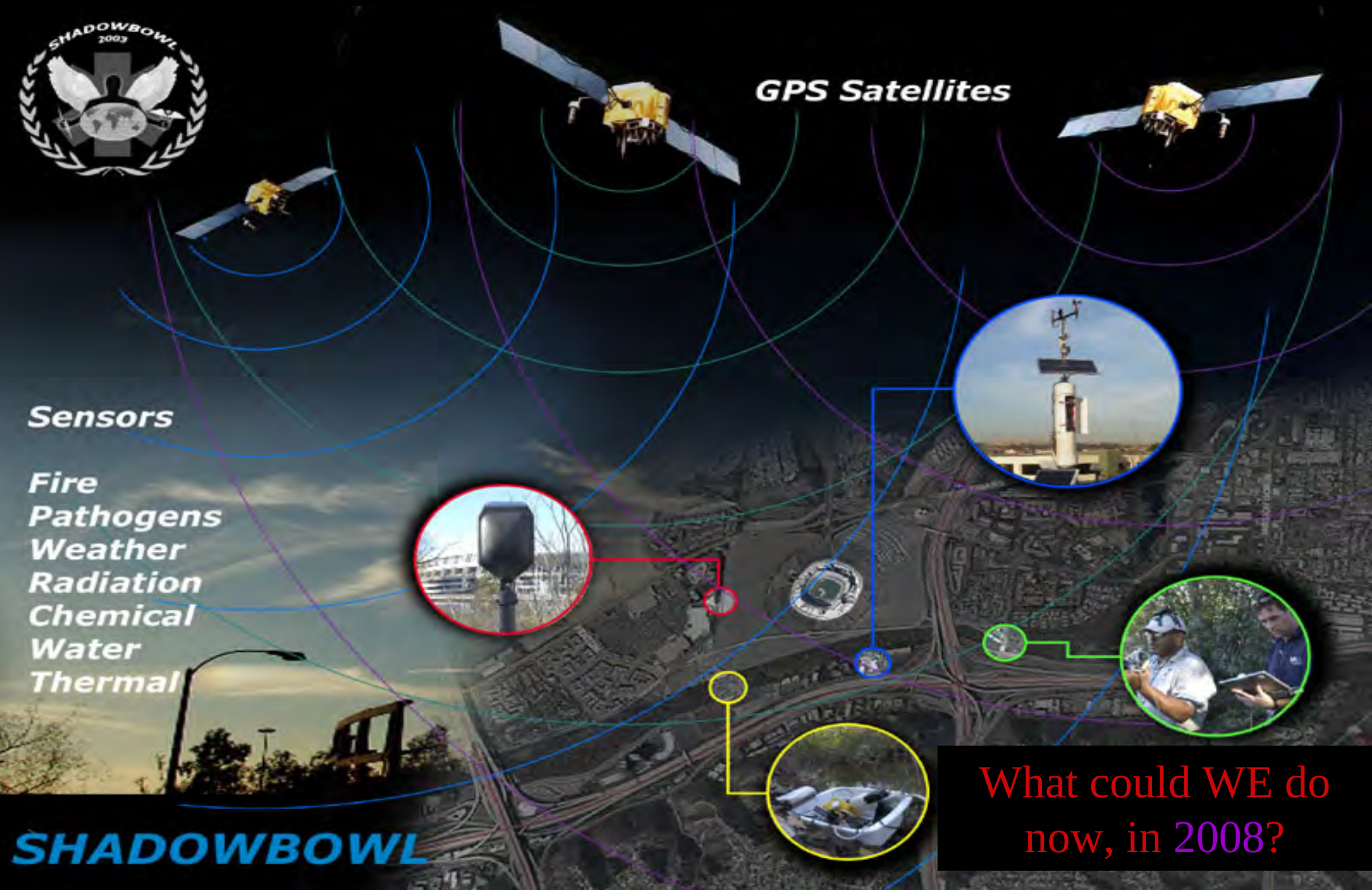
# Ex: ShadowBowl Communication Networks

## Rapid Prototyping and Deployment for Cameras, Sensors, and Data Fusion



# SDSU Viz Center in ShadowBowl

http://www.shadowbowl.sdsu.edu




What could WE do now, in 2008?

# Mash-up Example: Missing People (icon on image)

## Using GeoFusion Imagery as Underlayer for any SQL Database

Disconnectedness defines danger.

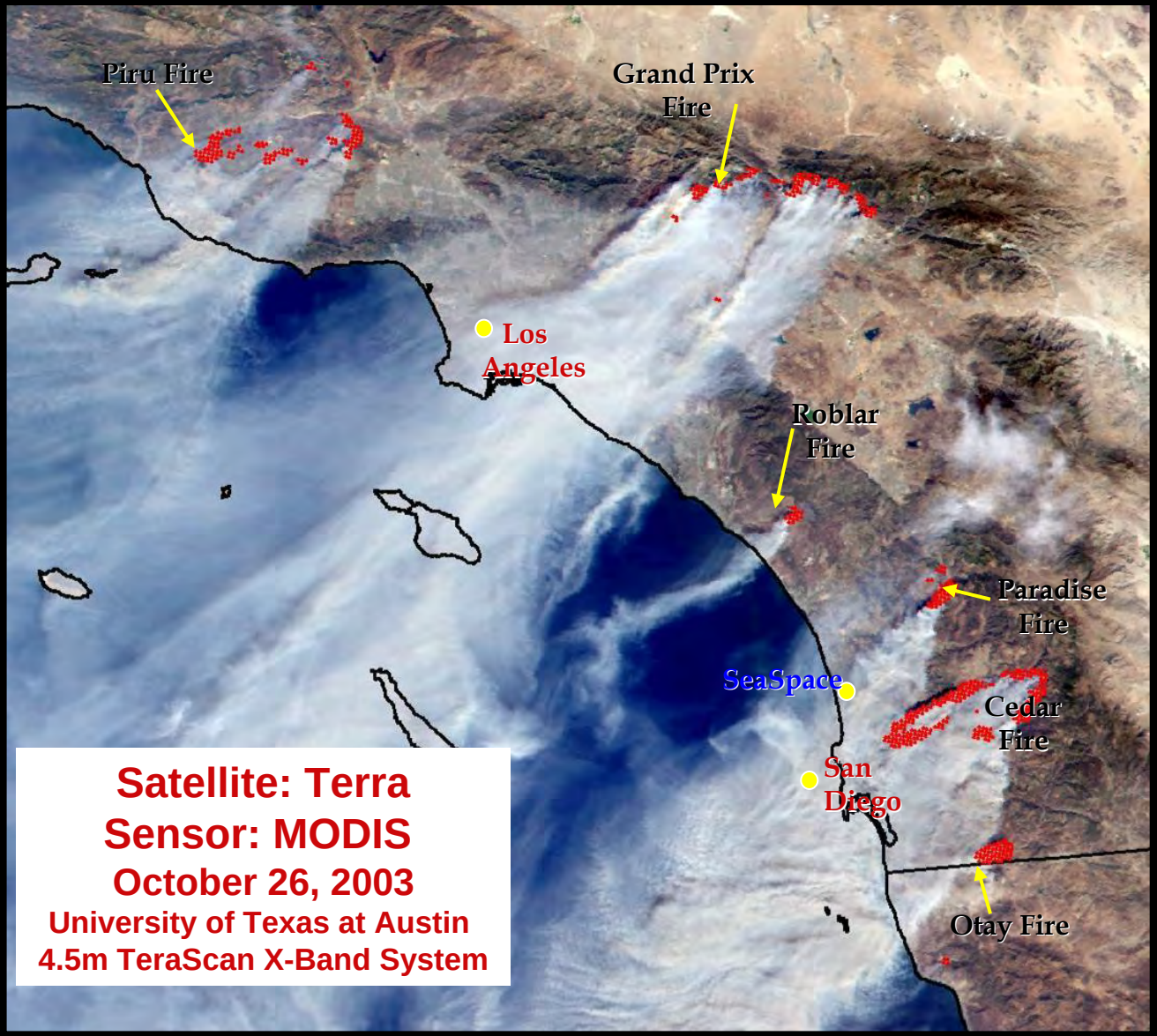
Dr. Tom Barnett, The Pentagon's New Map, 2004

Comms first.

Dr. Sheryl Brown, CIO, United States Institute of Peace

*http://www.strongangel3.net*

# MODIS imagery for Tactical Fire Response




## Vulcan Example:

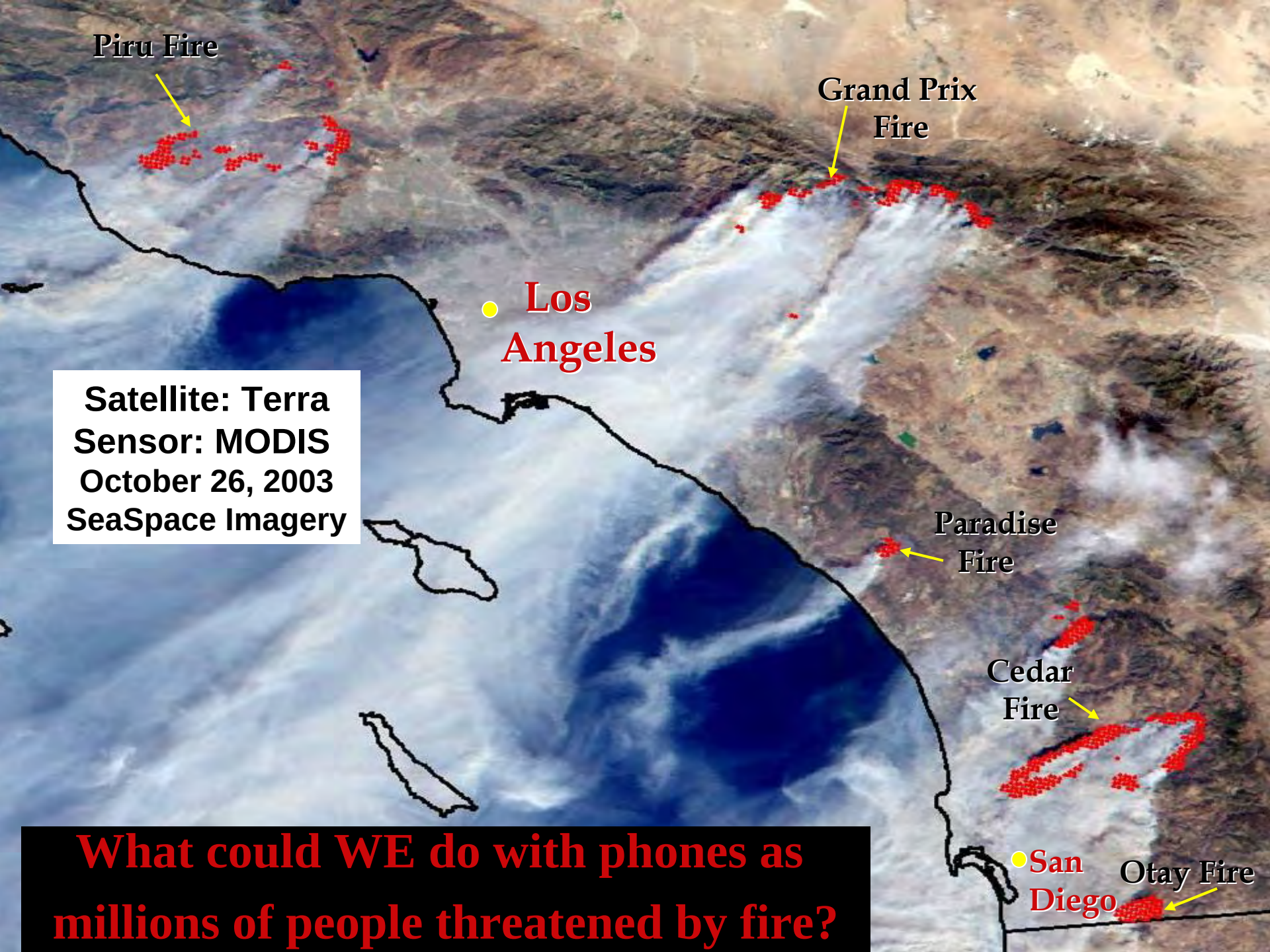
## The Devastating Southern California Fires of October 2003

- Over 660,000 acres burned

- Over 2500 homes burned

- 24 Deaths

**What can WE do For Rapid Fire Response?**


Piru Fire
Grand Prix Fire
Los Angeles
Satellite: Terra
Sensor: MODIS
October 26, 2003
SeaSpace Imagery
Paradise Fire
Cedar Fire
San Diego
Otay Fire
What could WE do with phones as millions of people threatened by fire?

# Homeland Security Education: The Current State

and

# The Naval Postgraduate School, Center for Homeland Defense and Security

Dr. Stan Supinski
Director, Partnership Programs

Homeland Security

# Homeland Security Education - Background

- Academia has a history of supporting national efforts
  - WWII – Manhattan Project
  - Cold War – National Security Affairs, Area Studies, Language Programs
- No HLS/HLD Academic Programs Prior to 9/11
- New agencies and policies spawned academic requirements and academic action
- Department of Homeland Security
  - DHS National Preparedness Directorate, FEMA (formerly Grants and Training) opted for the Naval Postgraduate School
  - Research Centers of Excellence Program
  - Homeland Security Academy and numerous new efforts by CLO
- Department of Defense (US Northern Command)
  - University of Colorado graduate level certificate program
  - Developed the Homeland Security/Defense Education Consortium or HSDEC

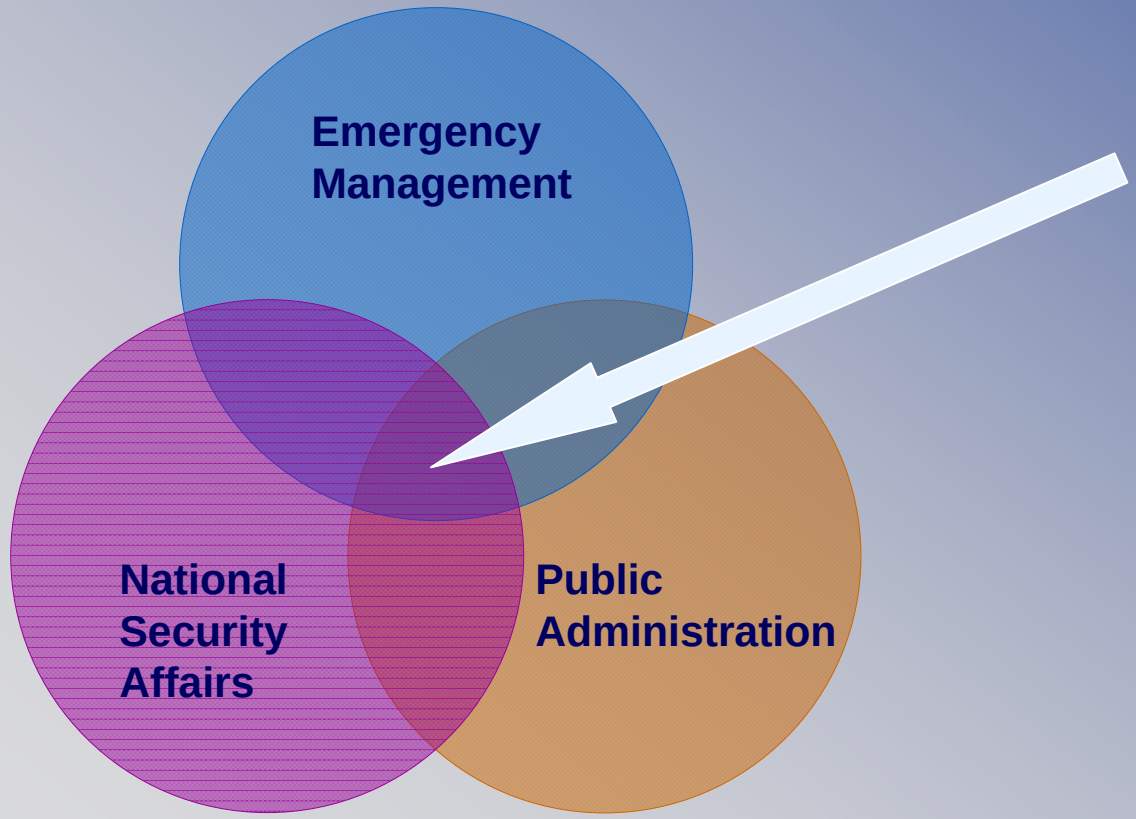
# Homeland Security Education Survey Project

- Conducted on behalf of HSDEC, Feb 2007
- Homeland Security Programs: 114 Degree Programs, 101 Certificate/Other Programs, and Growing!
  - Associates Degrees: 26 (A.A.: 0; A.S.: 26)
    - Most Common Courses: EM (12 of 26); HLS (7 of 26)
  - Baccalaureate Degrees: 36 (B.A.: 7; B.S.: 26; Applied Studies: 3)
    - Common Required Courses: Emer. Planning (12 of 36); HLS (8 of 36)
  - Masters Degrees: 49 (M.A.: 14; M.S.: 30; Other: 3 MPA/MPS/MBA)
    - Common Required Courses: HLS (8 of 49); EM (8 of 49)
  - PhD Degrees: 3 – Varied Concentrations, Individually Tailored

# Homeland Security Education Survey Project - Findings

- Degree name not necessarily indicative of underlying courses
- Programs that pre-existed 9/11 have subsequently been renamed homeland security (Nexus to homeland security is suspect in some cases)
- Progress
  - The field is becoming recognized as a legitimate area of study
  - Homeland security academic field is quickly growing
  - Academic collaboration is starting to occur with frequency
- Challenges
  - Accreditation (Coming soon through the HSDECA)
  - Program standards
  - Quality of instruction
  - Qualified Faculty

# Homeland Security/Defense From an Academic Perspective




Multiple Disciplines:
- -Law Enforcement
- -Health
- -Intelligence
- -International Relations
- -Engineering
- -Social Sciences
- -History
- -Psychology
- -Business

Etc, etc, etc….

# Homeland Security/Defense Education Consortium Recommendations

- Legal/Ethical Considerations
- Asymmetric Thinking
- Balancing Civil Liberties/Privacy
- Interagency Communications/ Cooperation

**Current and Emerging Threats**

**Context and Organizations**

**Policies, Strategies, and Legal Issues**

**Processes and Management**

## Practical Application

*Practicum*

*Critical Thinking*

*Other Areas*

- Leadership
- M&S
- Culture
- Statistics
- Mental Health

# NPS/CHDS Curriculum

- Semester 1
  - Intro to HLS; Asymmetric Conflict
- Semester 2
  - Technology in HLS; Intelligence (Organization and Policy Challenges)
- Semester 3
  - Critical Infrastructure Protection; Special Topics (i.e. Border Security, Public Health)
- Semester 4
  - Multidisciplinary Approaches to HLS; Comparative Government for HLS
- Semester 5
  - Planning and Budgeting for HLS; Psychology of Fear Management and Terrorism
- Semester 6
  - Knowledge Into Practice (Capstone); Thesis Research

# Sample Courses Nationwide

Certificates – Typically 4-6 Courses;

Masters Degree – Typically 12 Courses

Courses:

- Overview of Homeland Security/Defense
- Changing Nature of National Security
- Critical Infrastructure Protection
- Emergency/ Disaster Planning
- American Government and Policy Making
- HLS Civil Society and Human Rights
- Public-Private HLS Partnerships (Business)
- Intergovernmental/ Interagency Relations
- Fundamentals of Terrorism
- Understanding the Threat
- Criminal Justice/Legal Issues
- Risk Assessment and Analysis

# Sample Programs

- **Univ. of Colorado/Col Springs**, Graduate Level Certificate, residence/DL (4 courses) (and forthcoming MA)
  - Introduction to Homeland Defense
  - Interagency Operations
  - Understanding the Threat
  - Critical Infrastructure Protection
- **East Carolina Univ.** Graduate Certificate in Security Studies, DL (5 courses)
  - Intergovernmental/Interagency Relations
  - National Security
  - Criminal Justice
  - Global Terrorism
  - Disaster Planning
  - Environmental Health
- **Univ. of Massachusetts,** Graduate Certificate in Homeland Security, (4 Courses)
  - Criminal Justice focus; designed for personnel public safety, security management, and law enforcement; executives in corporations responsible for overseeing in-house security programs

# Are There Jobs?

## YES!

**DIRECTOR OF HOMELAND SECURITY, CITY OF PLANO, TEXAS**

**(Starting Salary from the mid $70's to 110,000, D.O.E.) The Director of Homeland Security (DHS) is a new position created to emphasize the critical nature of the community's security needs…will direct all aspects of the City's emergency preparedness and response efforts…work cooperatively with the Chiefs of Plano's Police and Fire Departments, other city officials, and agencies at local, state, federal levels….maintain/ revise the City's Emergency Operations and Hazard Mitigation Action Plans…coordinate training and readiness…manage the Emergency Operations Center…coordinate response to actual emergencies and disasters…. direct a staff of four and manage an Operating Budget of $360,000.**

# Are There Jobs?

| | Number of employed (*) | Projected employment (*) | Change Number (*) | Change Percent (*) | Number of employed (**) |
|---|---|---|---|---|---|
| Industry | **2002** | **2012** | **2002-2012** | **2002-2012** | **2003** |
| **Emergency Management Specialists** | 10,948 | 14,040 | 3,092 | 28.2 | 9,800 |

**Source of Information:** US Department of Labor
www.dol.gov (March, 2005)

# Are There Jobs?

The Center for Domestic Preparedness in Anniston, Alabama (Office for Domestic Preparedness, Department of Homeland Security) estimates that "there are more than **11 million** emergency responders and other personnel in this country that would need training to deal with terrorist incidents."

RECENT DENVER POST ARTICLE - Northrop Grumman, the aerospace and defense conglomerate, is expected to expand its Aurora campus by hiring **350 employees** to work on about 30 homeland security-related contracts. Annual salaries will average $80,000.

# Are There Jobs?

Per *Occupational Outlook Quarterly*, it is one of the fastest growing areas with jobs in:

- Business Continuity, Transportation
- Critical Infrastructure Protection, Health Care
- Intelligence Analysis
- Cyber Security
- Border Occupations
- Banks, Physical Security
- Utilities, Technology
- And…every level of government

# Center for Homeland Defense and Security - Mission

*To strengthen the national security of the United States by providing graduate level educational programs that meet the immediate and long-term leadership needs of organizations responsible for Homeland Defense and Security*

# CHDS Programs

- Masters Degree
  - Primarily State and Local Students
  - On "Scholarship" from DHS (Grants and Training)
  - 64 students (4 cohorts of 16) Each Year (from applicant pool of 2600 per class)
  - Hybrid Program (in residence followed by DL)
  - 30 Faculty/50 Staff
  - National Capital Region Cohort

# CHDS Programs (cont.)

- Executive Education – In-Residence
  - Began Aug. 2006
  - 4 one week in residence sessions over 12 months
  - Fills gap between MET and Masters program
- Mobile Education Teams
  - Provide seminars to strengthen US capability for HLS
  - Primary focus on governors, mayors and senior HLS staffs
  - 2000+ elected and senior leaders have attended

# CHDS Programs (cont.)

- Homeland Security Digital Library
  - Nation's premier collection of HLS material
  - Content gathering and summation teams
- Homeland Security Affairs Journal (www.hsaj.org)
  - Open Access electronic journal
  - Focus on policy, strategy, technological applications and best practices
- University and Agency Partnership

# University and Agency Partnership Initiative

- Support the nationwide development of Homeland Security education programs at all levels
- Leverage DHS investment in CHDS programs- create a "multiplier effect"
  - Vastly increase the number of students receiving HS education
  - Share all material developed for the CHDS Masters Program and library
  - Develop a community of practice through on-line forum
  - Conduct national level conferences
- Develop a cadre of scholars and senior policy-makers in all sectors dedicated to the establishment of HS as an academic discipline
- Identify and address critical research needs throughout the Homeland Security and Homeland Defense Communities

# Partners (currently 100+ members)

- University of Connecticut
- Long Island University
- University of Washington
- University of New Hampshire
- University of Mississippi
- Duke University
- Chaminade
- Virginia Tech
- University of Colorado, Colorado Springs
- University of Maryland
- NYU
- Auburn
- University of Alabama
- Purdue
- Eastern Carolina
- US Coast Guard Academy
- Homeland Security/Defense Education Consortium
- Penn State
- Western Carolina
- LSU
- Eastern Kentucky University
- University of Akron
- FBI Academy
- Ohio State University
- University of Maine
- US Army War College
- University of Denver
- Massachusetts and California Maritime Academies

# Conclusions

- Academia and government have undertaken significant effort to educate the workforce for today's political environment
- Homeland Security education is growing and gaining legitimacy
- HSDEC and CHDS have taken lead roles in academic and workforce development
- The multidisciplinary nature of the field is recognized and reflected in academic programs
- There are lots of choices for education at every level
- Jobs are there!

# *Questions?*

## Contact:

Stan Supinski (sbsupins@nps.edu)

(719) 482-5452

MSPCI Program

# National Trends in Homeland Security Education: UW's Graduate Program in Critical Infrastructure Protection

**Hilda Blanco, Ph.D.**
Professor and Chair
Department of Urban Design and Planning
Director of the MSPCI Program
University of Washington

US Department of Homeland Security's Science and Technology Stakeholders Conference Held in Los Angeles, January 14, 2008

STRATEGIC PLANNING
FOR CRITICAL INFRASTRUCTURES

# MSCPI Program

- Outline
  - **Program overview**
  - **About the students**
  - **Issues and Challenges**

# Program Overview

- Created in aftermath of 911
- Created for officials and decision/policy makers in public and private sector, to be more effective in management of critical infrastructure systems and emergency services
- Fully accredited master's program through Department of Urban Design & Planning, 52 credit Masters program
- Completely on-line program, 2 courses per quarter, 8 quarters or two years to complete
- Combines methods courses with infrastructure courses
- Culminates in a capstone experience

# A Unique Blend

- Brings business and analytic frameworks to management of infrastructure systems (methods courses):
  - *A systems approach — the forest, not the trees*
  - *Modeling — analyzing the problem correctly*
  - *Strategic planning — tools that improve the future*
  - *Continuity Planning*
  - *Legal, Constitutional, Ethical Issues*
  - *Risk Management*
  - *Spatial Analysis (GIS)*
- Technical learning about specific infrastructures equips students to tackle real-world problems (content courses)
  - *Physical Infrastructure Systems*
  - *Cybersecurity*
  - *Public Health and Emergency Management*
- Case study approach brings the two together (practica and capstone courses)
  - *Integration and synthesis — Program concepts*
  - *Application — Solving a real problem*
  - *Multiple methods — Problem-based case, tabletop exercise, research project*

STRATEGIC PLANNING
FOR CRITICAL INFRASTRUCTURES

# About the Students

- Total: 32

- Education level:
  - **BA, BS 67%**
  - **Masters 29%**
  - **PhD 5%**

- Educational background:
  - **Liberal arts (history, geography) 19%**
  - **Social science (political science, public administration, criminal justice) 48%**
  - **Natural sciences (engineering, geology, health) 33%**

- Age:
  - **< 25 29%**
  - **26-35 48%**
  - **36-45 10%**
  - **46 > 10%**

- Employment:
  - **Private sector 34%**
  - **Government 41%**
  - **Military 25%**

- Residency:
  - **Washington 62%**
  - **Other Western states 19%**
  - **East Coast 10%**
  - **International locations 10%**

STRATEGIC PLANNING
FOR CRITICAL INFRASTRUCTURES

# Graduates

## Background & Jobs

- **Technology consulting and law enforcement : New Deputy Director of the Office of Emergency Communications in the DHS Cyber Security and Telecommunications Directorate**

- **Security operations specialist at the Hanford site in WA state: FBI Special Agent**

- **Analyst at defense and national security contracting company: Program Manager**

- **Civil engineer in state transportation department: Master planning and CIP development**
- **Communications and law: US Air Force civilian in Industrial and personnel security**

- **Youth education consultant: Project Manager at LA Emergency Management**

- **Training and scheduling Air Force officer: Crisis Action Planner for US Pacific Command**

# Issues and Challenges

- Difficulties in reaching target audience for program
  - **Lack of marketing expertise at the University with security issues and with military**
  - **Delays in internet advertising strategy**

- Challenges with on-line delivery
  - **Some subject matter difficult to teach, e.g., GIS**
    - *Required costly revisions of course*
  - **Communications between faculty and students critical**
    - *Explicit communication about feed-back, when and where*
  - **Designing group assignments for an on-line environment**
    - *Striking a balance between group interaction and individual work*

STRATEGIC PLANNING
FOR CRITICAL INFRASTRUCTURES

# Contact Information

**MSPCI Website:**
www.criticalinfrastructures.washington.edu

**Karen Fishler, MSPCI Program Coordinator**
206-616-8919  Fax: 685-5957
kfishler@u.washington.edu

**Rachel Toplin, Program Coordinator**
Academic Programs, Educational Outreach
206-616-4720
rtoplin@extn.washington.edu

# Homeland Security Certificate Program

- **5 course program**
  - **MGMT2050 Intro to HS**
  - **LEGL 2600 Legal Aspects of HS**
  - **ITEC 1300 Survey of Info Security**
  - **MGMT2506 Org Behavior**
  - **MGMT 2750 HS Assessment**

Mr. Tracy DeWitt
Mid-South Community College

# Current class

- **11 students in MGMT 2050.**
- **First classroom instruction for program.**
- **Class participation**
  - **Tests, papers and classroom discussion.**
- **Classes are also available online**

# Certificate Goals

- **Provide expertise in homeland security training**
- **Develop and deliver course content based on current programs and practices**
- **Provide qualified workforce to regional employers**
- **Educate the local community**

# Why a Community College?

- **Mandate to train the workforce**
- **Credentials**
- **Partner with agencies (DHS)**
- **Locally focused and accountable**
- **Proven high quality/cost effective**
- **Accessible, responsive, accredited**
- **Degree oriented**
- **Solid Outreach**
- **Customized Instruction and Programs**

# Online Course Programs

Available online:

MGMT2050 Intro to HS

LEGL 2600 Legal Aspects of HS

ITEC 1300 Survey of Info Security

MGMT2506 Org Behavior

Classroom/lab/practicum:

MGMT 2750 HS Assessment –

# Topics in the Certificate Content

- **History of Emergency Management and Homeland Security**
- **Community Emergency Response Capabilities**
- **Weapons of Mass Destruction**
- **Risk and Vulnerability Assessment – skills and abilities**
- **Bomb Threat Management**
- **Cyber security**
- **Mass Casualty Awareness**
- **Business Continuity Training (Private Sector)**
- **Continuity of operations (COOP)**
- **National Response Plan**
- **Conferences, Seminars**

# Associations

- Workforce Development
- Networking with industry
- Office of Emergency Preparedness
- Community Colleges
- State Office of HS/EM
- DHS
- Consulting firms
- HSDEC

# Future

- Expand Online Program
- Broaden student pool
- Center of Excellence for HS education
- Regional Training for the State
- National Guard Training
- Emergency Management Training
- Increase program awareness in other departments
- Seek additional grant funding
- Continue to build relationships (Technology)
- Seek additional training opportunities
- Expand Marketing efforts
- Instructor credentials and certification

# Contact

tgdewitt@midsouthcc.edu

# Innovation & Technology Adoption

## Identifying & Implementing Great Ideas

Neal Thornberry PhD
Anita Salem M.S.
LCDR Andre Billeaudeaux, USCG

Naval Postgraduate School

# Introduction

**Sponsored by**

Homeland Defense & Security, Naval Postgraduate School

- Wendy Walsh

**Presenters**

Organizational Innovation

- Dr. Neal Thornberry, Forum for Innovation Research & Teaching, NPS

Using practitioner input to increase adoption

- Anita Salem, Center for Defense Management Reform, NPS

A case study in innovation

- LCDR Andre Billeaudeaux, USCG

# Organizational Innovation: Antidote or Oxymoron?

In Search of the *"Dragon"*

The McGraw-Hill Companies

BusinessWeek

APRIL 24, 2006

# THE WORLD'S MOST INNOVATIVE COMPANIES

p. 62

| WHO | HOW |
| --- | --- |
| APPLE | Innovator in chief |
| P&G | Share patents |
| SAMSUNG | Network of brainy scientists |
| IBM | Design strategy |
| BMW | Speed cycle time |
| STARBUCKS | Get into the customer's head |
| TOYOTA | Free time to experiment |
| GOOGLE | Embrace suppliers |

# Corporate Mortality is very high!

Average life expectancy of all firms, regardless of size, measured in Japan and much of Europe, is only 12.5 years.

The average life span of a multinational organization - Fortune 500 or equivalent - is around 45 years.

One third of the companies listed in the Fortune 500 in 1970 for example, had disappeared by 1983 - acquired, merged or broken to pieces.

The first S&P index of 90 major US firms was created in the 1920s. The firms on that original list stayed there for an average of 65 years. By 1998, the average tenure of a firm on the expanded S&P 500 was 10 years.

Source: The Living Company, Arie de Geus

# The Challenge: Creating and Sustaining Growth

90% of all firms are unable to sustain an above-average growth rate for more than a few years

80% of venture capital funded start-ups fail within the 1st 2 years

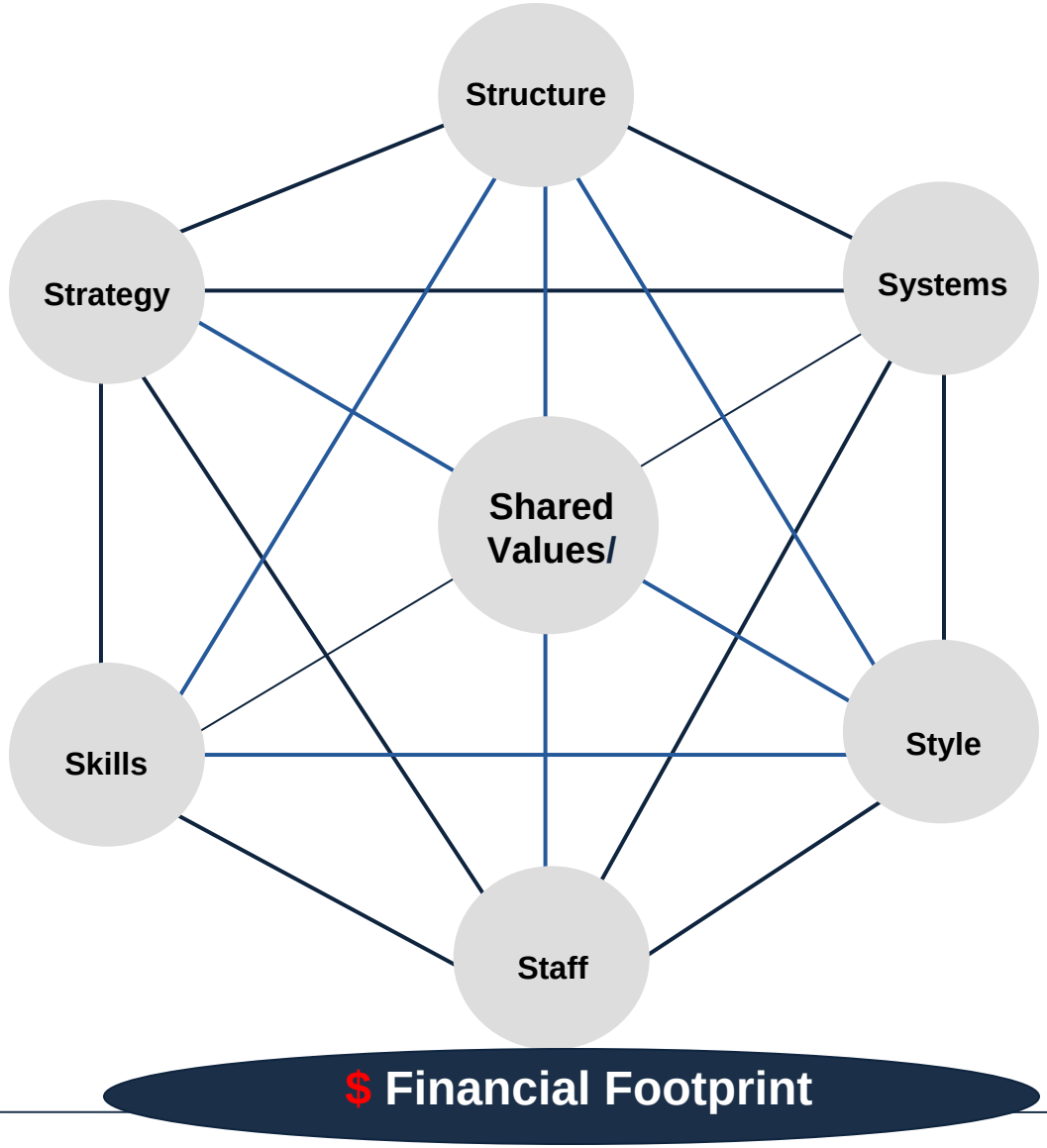
75% of new products launched by established firms fail

Source: Christensen, 2004

# The State of Innovation

- Where Quality was 10-15 years ago
- Ideation is not the end game(current IBM commercial)
- Implementation & sustainment are the real issues
- Organization for innovation
- Absence of “Best Practices”
- Replication issues
- HR strategies for  Jekyll and Hyde personas
- Confusing innovation & entrepreneurship
- Accepting &  managing the oxymoron of “organizational innovation”
- Legitimizing “Corporate Judo”
- Lack of disciplined methodologies to differentiate great ideas from great opportunities

# The 7S + 1 Framework



# Entrepreneurship: Innovation's lesser known sibling

- Entrepreneurship always involves innovation; Innovation does not always involve entrepreneurship

I
D
E
A
S

# The Balancing Act

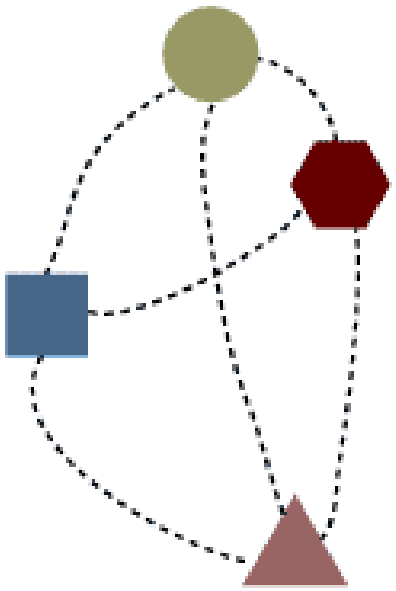
Timmons, 1999

# Will the Innovation Create Value?

$$V = B/C$$

# A new model of Innovation

**Innovation Network**

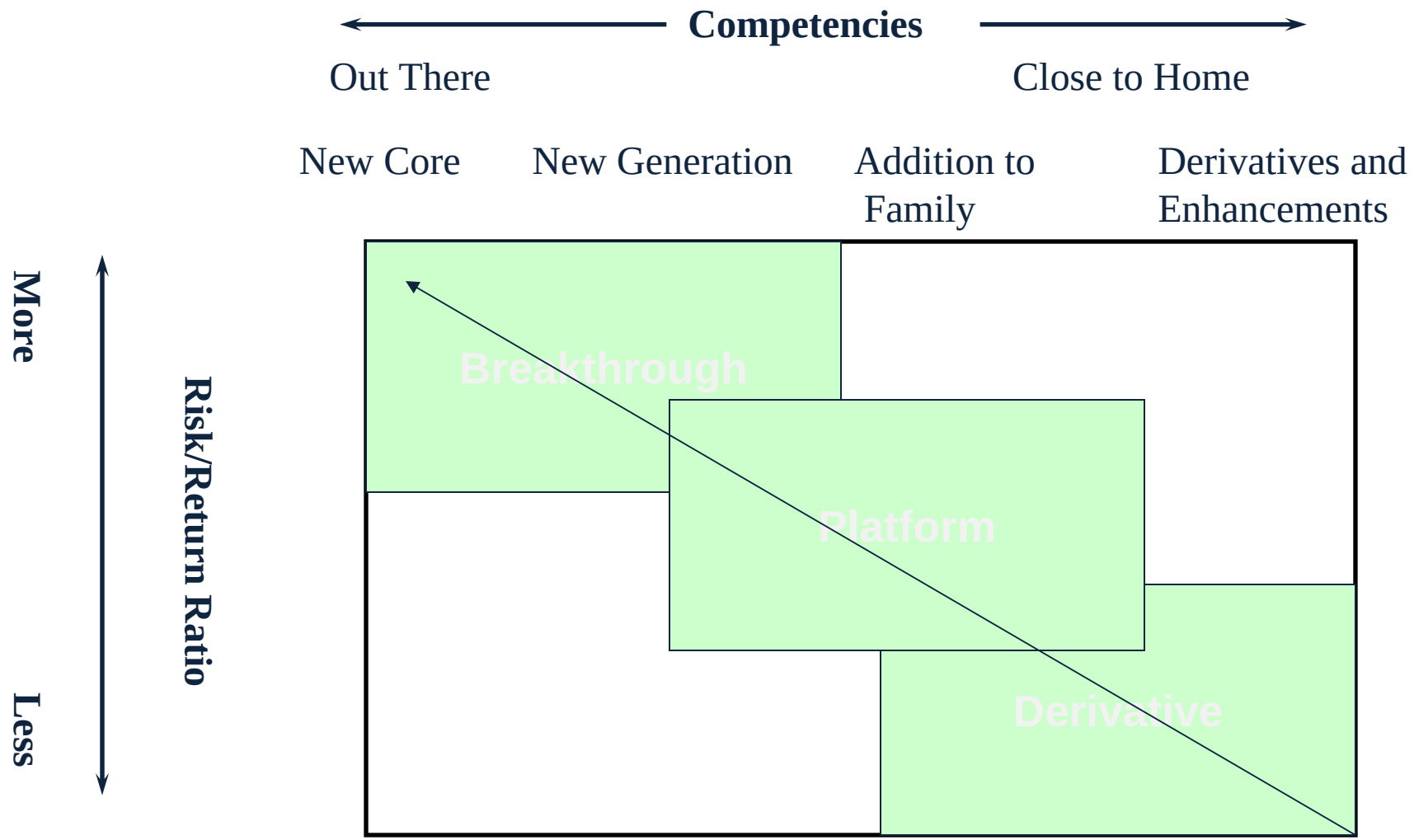


| Business model | Specialization |
|---|---|
| Inventor | Intellectual powerhouses that conduct basic science research and/or design products and services that result in patentable inventions. **Example:** MIT, IDEO, SRI, GE Global Research, KAIST, Celera, Oxford, Microsoft Research, HP Labs, CNRS, Persistent, IIT |
| Transformer | Multifunction production and marketing services that convert inputs from Inventors and other Transformers into valuable business innovations for either internal or external customers. **Example:** Dell, Pfizer, BP, Merrill Lynch, SAIC, IBM, Infosys |
| Financier | Funding source for Innovation Network service providers — especially Inventors and startup Transformers. Financiers will seek to own intellectual property rights for inventions. **Example:** Cargill Ventures, Silicon Valley Bank, Garnett & Helfrich Capital, InterActiveCorp, ICICI Bank, Vulcan, IP2IPO |
| Broker | Market makers that find and connect Innovation Network service providers — buying and selling or enabling service delivery both within and among companies. **Example:** Knowledge Campus, yet2.com, PLX Systems, Big Idea Group, InnoCentive, Evalueserve, ISTC, Intellectual Ventures, P&G's Technology Entrepreneurs, DCMA, METI, TIE |

Source: Forrester Research, Inc.

# Opportunity Evaluation

- Differentiate good ideas from real opportunities
- Business plan or paying customer
- Follows the opportunity think inking process
- Compelling, defensible, durable, sustainable
- A unique value proposition for a customer set
- Is the value worth the risk?


Competencies
Out There
Close to Home
New Core
New Generation
Addition to Family
Derivatives and Enhancements
More
Risk/Return Ratio
Less
Breakthrough
Platform
Derivative

# The Balancing Act

# Opportunity Identification & Shaping

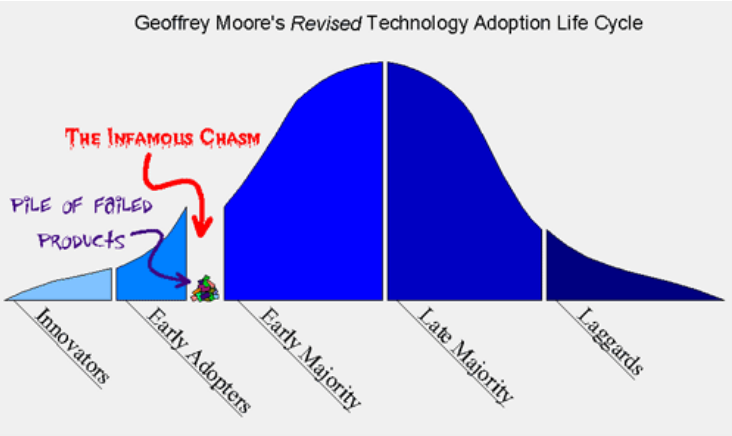
## How light bulbs are powered by logic

# Using practitioner input to shed some light

1. Human barriers to adoption
2. Methods for understanding the “problem space”
3. Practice session on problem analysis
4. What people need

# Barriers to adoption—why humans matter

## Problem 1: Designing for wide adoption




- Features vs. Usability
- Desirability vs. Efficiency
- Narrow vs. Wide adoption

## Problem 2: Designing for interoperability

- Language—codes vs. natural language
- Frequency of use—Police & Fire vs. Utilities
- Training—Learnability vs. Intuitiveness
- Culture—big city vs. rural

"Governance is the greatest gap being found in field testing of interoperability initiatives"

Robert Zanger, U.S. Department of Justice

# Barriers to adoption—buy-in and sustainability

## Organizational ROI

- Customer…..convenience, ease of use, features
- Social…….benefits to society or group
- Operational...improved infrastructure, efficient processes
- Strategic…….fulfilling the mission, aligning with strategies
- Financial……increased revenue, lower costs, risk reductions

*GIS software for Police:* officer **safety** **through** **Process** **shares information** **improvement** in **combining** **tactics**

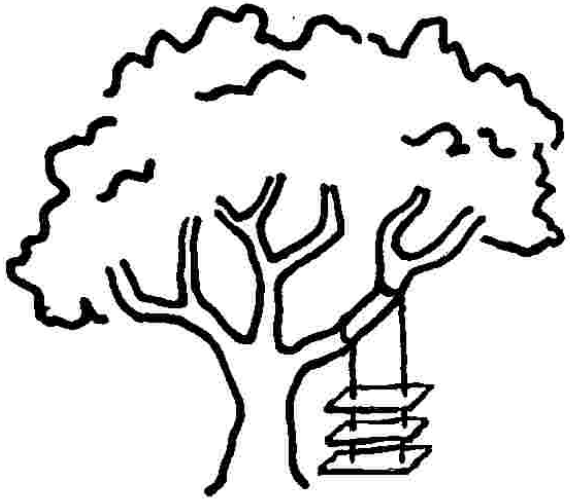
"Best Practices" page of Intranet **information** about water supply facilities between departments exercises and agile practices from compliance of the software

**use of PPE's** for **90 million** in the Department of Labor & Industries increased revenues based on A/B testing of phones

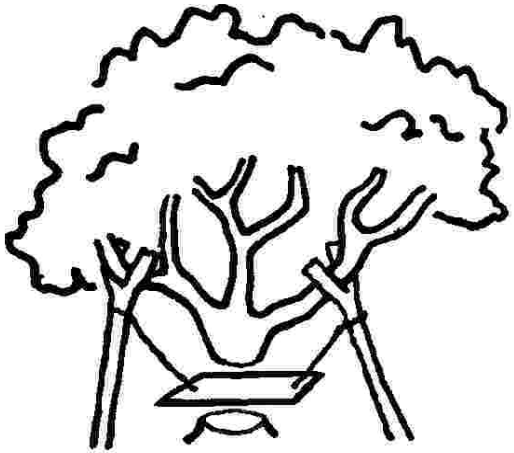
## Human goals

- Human needs and goals drive value
- Value varies by practitioner (interoperability)

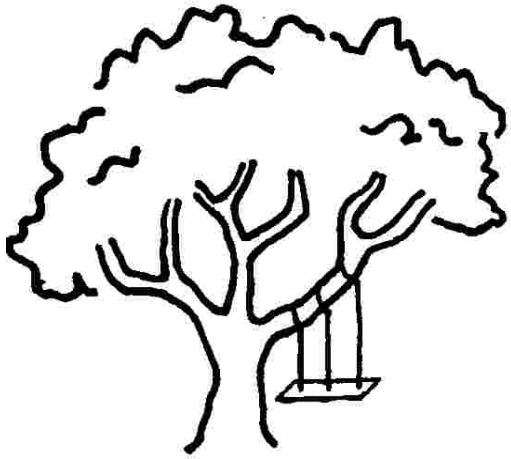
# Don’t do this



Features over usability



Product requires extensive customization



Specs based on system  not users

# Do this

Human: Infant/Parent
Need: Calmness/Safety & Time
*"It's for gentle soothing and rocking for baby, not for jostling and bouncing fun, that's what a bouncer is for"*

**Provide value based on *human needs***

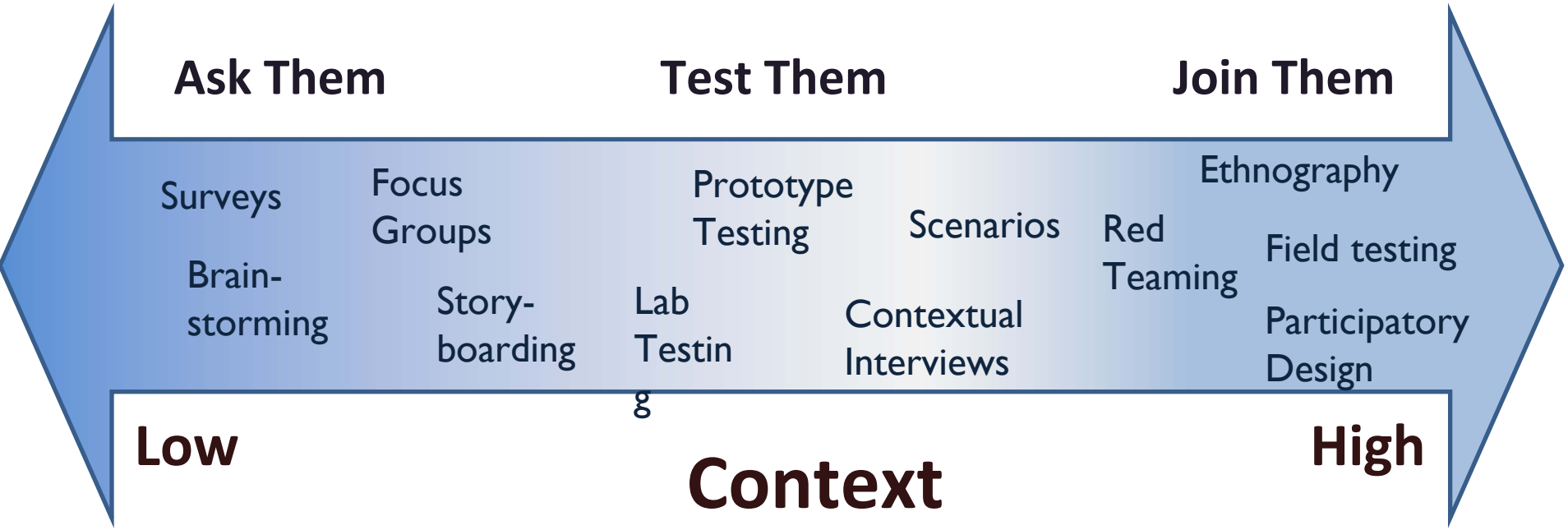
Human: Adult
Need: Relaxation
*"The minute I sat in it all the stress of the day was erased."*

Human: Adult**s**
Need: Relaxation & Intimacy
*"**We** can read, nap, or enjoy a drink in comfort"*

# Understand what people want

## Understand the context of use

Who, what, why, where, when, and how



# An exercise in discovering value

The mobile phone contextual interview

1. Partner up with 1-2 others
   - One person gets interviewed
   - One person interviews
   - One person takes notes of issues
2. Ask them to talk about their mobile phone use
   - What do you like best?
   - What do you like least?
3. As things come up, ask them:
   - **Why** they do it?
   - **How** they actually do it
   - **Have them provide an example or show you**

Why?

How?

Examples!

# Specify what people want

| Effectiveness | Efficiency | Desirability |
|---|---|---|
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| | | |
| | | |

| Metric | Metric | Metric |
|---|---|---|
| Success rates | Errors | Purchase patterns |
| Adoption rates | Time measurements | Attitudinal Surveys |

# Examples of Good Opportunities

iPhone

“It just feels so natural …every screen should be able to be touched”

"This is the perfect solution for people like me who simply want to make calls and send the odd text message,"

“It’s sleek, you can keep in contact with anyone, anywhere! surf the web, share pics, or email... and its all at your fingertips!”

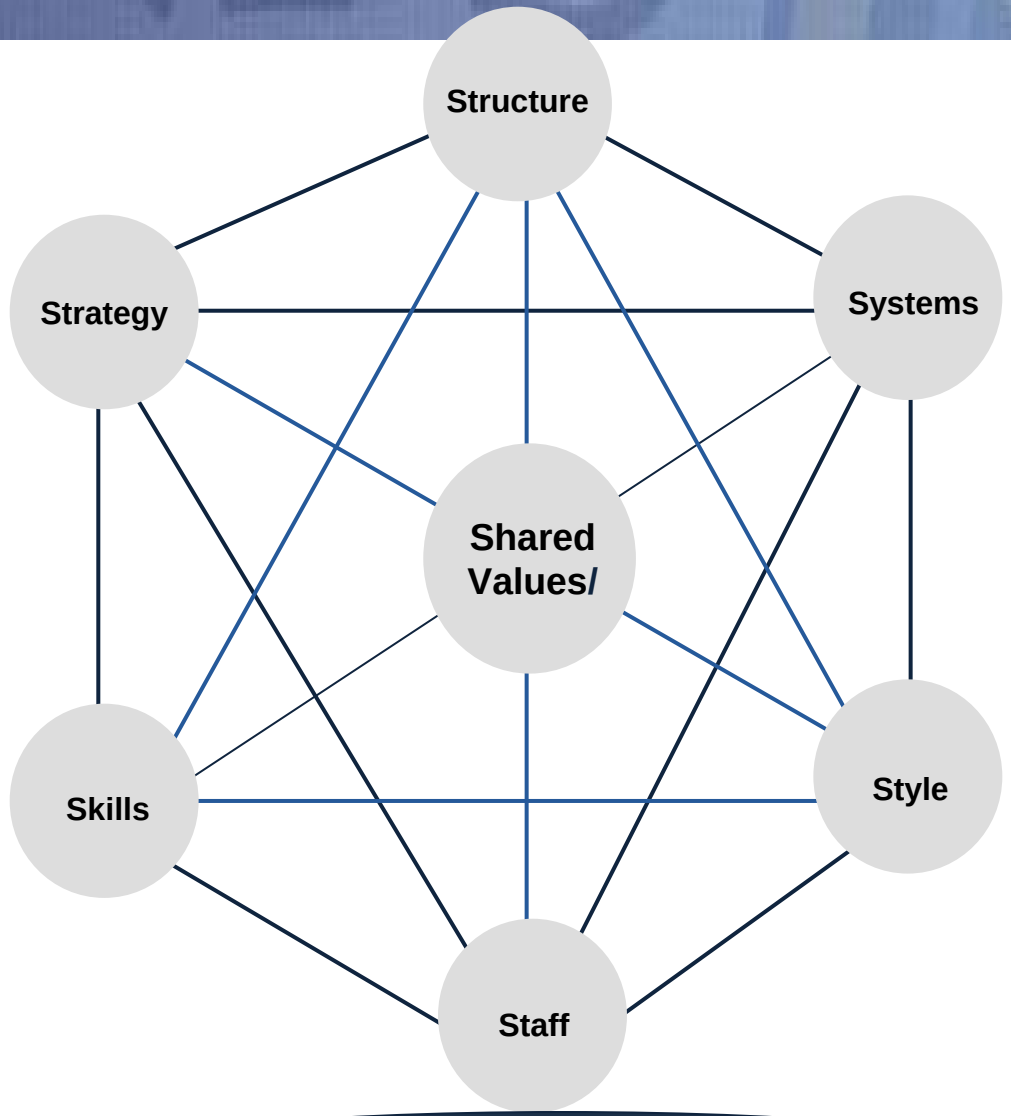
"All of us kids have been wondering when a 'senior-friendly' phone would hit the market

# Case Study in Innovation

The Coast Guard

Post 9-11

# The 7S + 1 Framework / Post 9/11 CG




**Post 9/11 CG Footprint**

# Coast Guard post 9/11 Strategy

**"The vastness and complexity of the maritime domain make public and private partnerships a *prerequisite* of preparedness and effective response."**

*Then Vice Admiral Thad W. Allen before the Senate Committee on Commerce, Science & Transportation March 9, 2006*

**"The maritime threat environment of the 21st Century *requires* broader scope and a more comprehensive vision.**

**We *must* look beyond traditional surveillance of ports, waterways, and oceans, and continuously adapt to new challenges and opportunities.**

**We *must* set priorities for existing and developing capabilities to efficiently minimize risks while contending with an uncertain future."**

*The National Plan to Achieve Maritime Domain Awareness for the National Strategy for Maritime Security Oct 2005*

# Coast Guard Staffing Picture

**1 firefighter for every 280 people**
1 million firefighters – 750,000 volunteer

**1 sworn officer for every 385 people**
436,000 sworn law enforcement personnel
291,000 sworn sheriff's office personnel

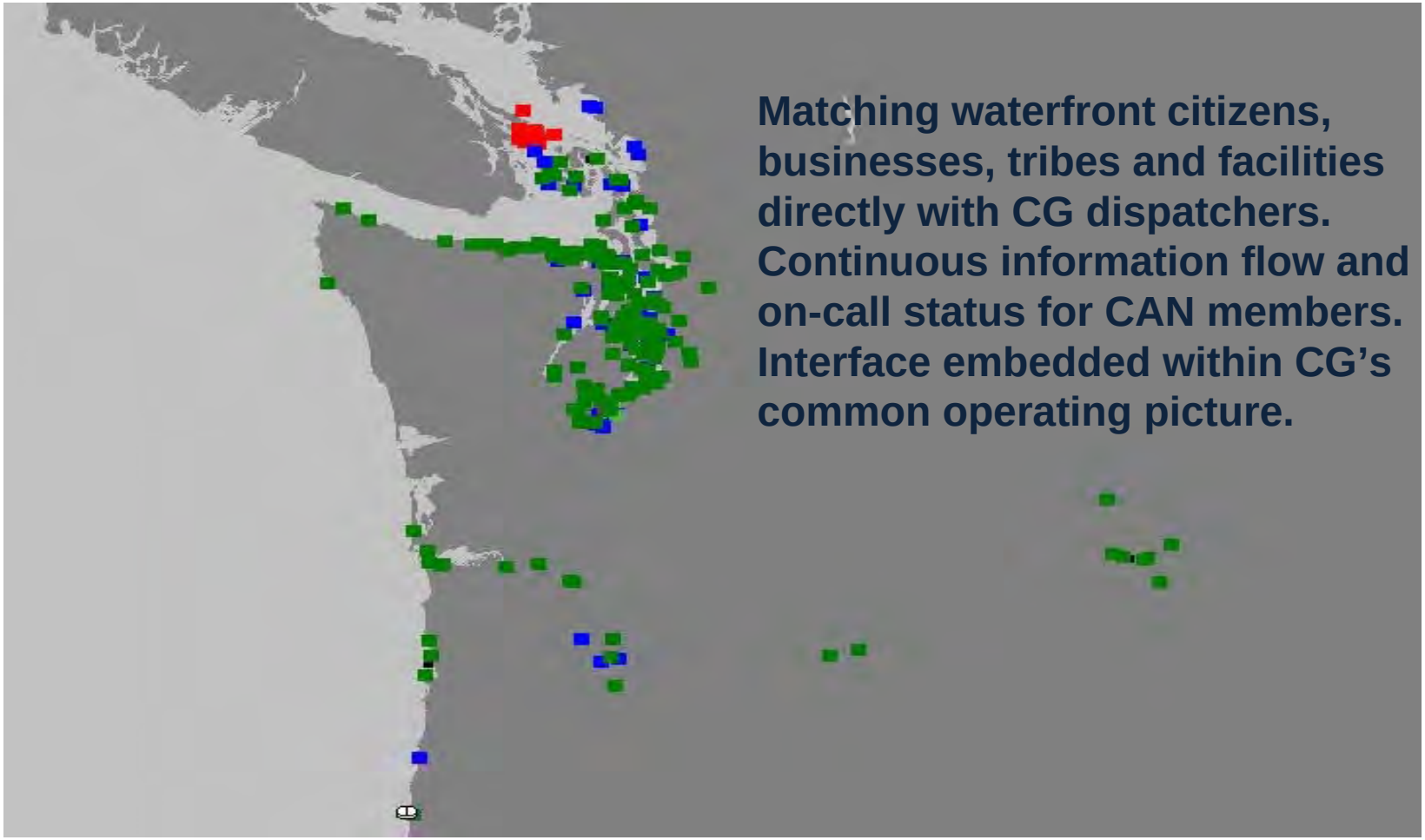
**1 EMT/paramedic for every 325 people**
860,000 all levels of pre-hospital services:
basic EMT, intermediate EMT, paramedic

**1 Coast Guardsman for every 6,300 Americans**
**1 Direct Operational Coast Guardsman for 50,000 Americans**
**1 Direct Operational Coast Guardsman for every 16 miles of shoreline**
45,000 Active Duty Coast Guardsmen

# Coast Guard Structure

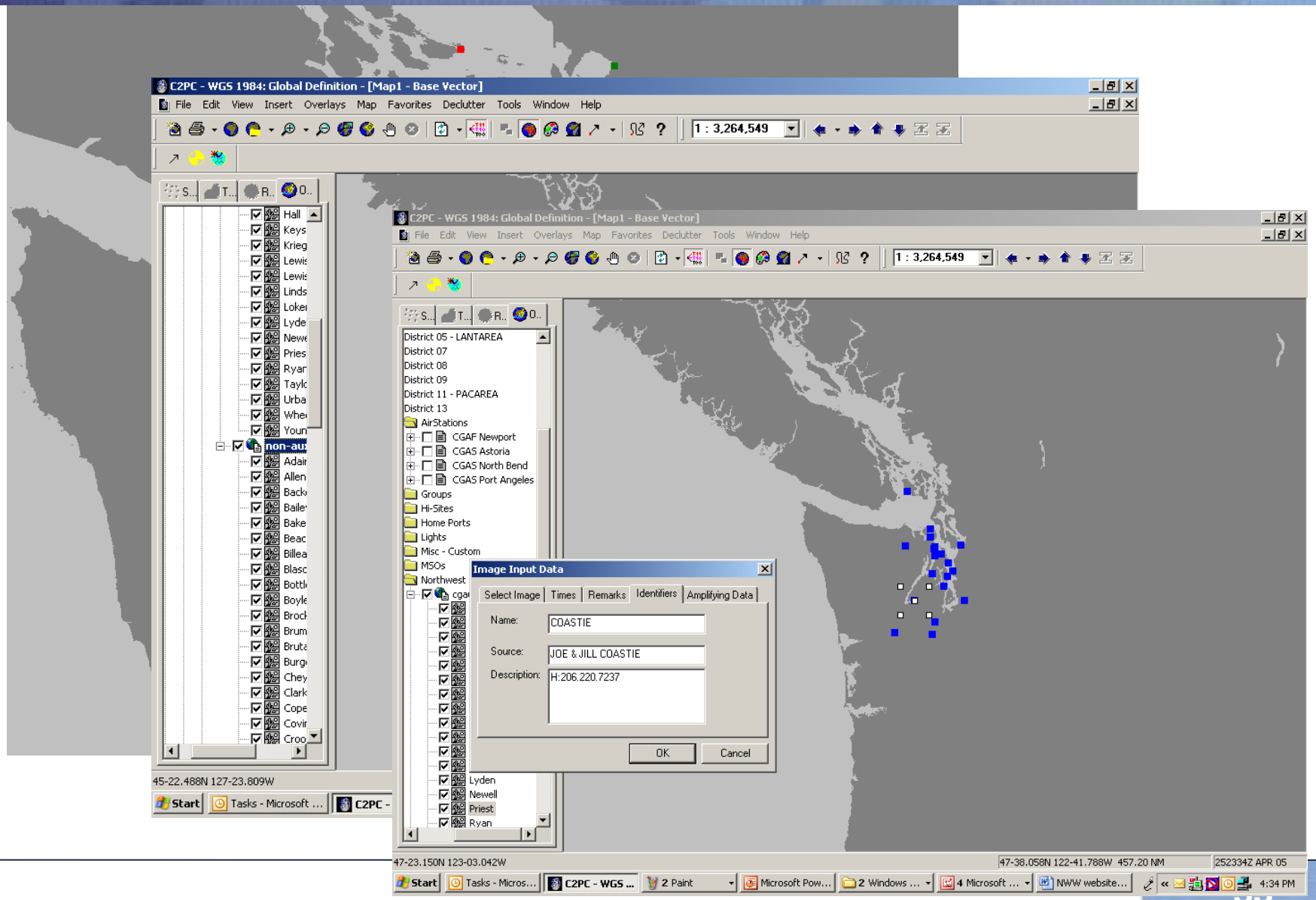
- In 2001 the strain of Coast Guard's mission demands came to light. Studies by the Inspector General & a CG internal review team that year found that readiness conditions at the 188 CG multi mission stations had been deteriorating for over 20 years. This debilitating situation was exacerbated after 9/11 according to the GAO
- After 9/11, the GAO found that the CGs multi mission stations had experienced a substantial rise in overall activity levels. This rise in mission demand came with a prioritization of the CG's new homeland security demands. Field stations were summarily assigned the brunt of the Coast Guard's port security responsibilities and considerable increases in the stations' security workloads.
- This trend is documented in boat operational hours before & after 9/11. Boat hours increased by 44%. **F**rom 217,000 hours prior to 9/11 to 300,000+ hours by the end of FY 2004.
- Traditional missions, SAR, RBS, Environ Protection etc. suffered.

# DHS/Coast Guard Innovation

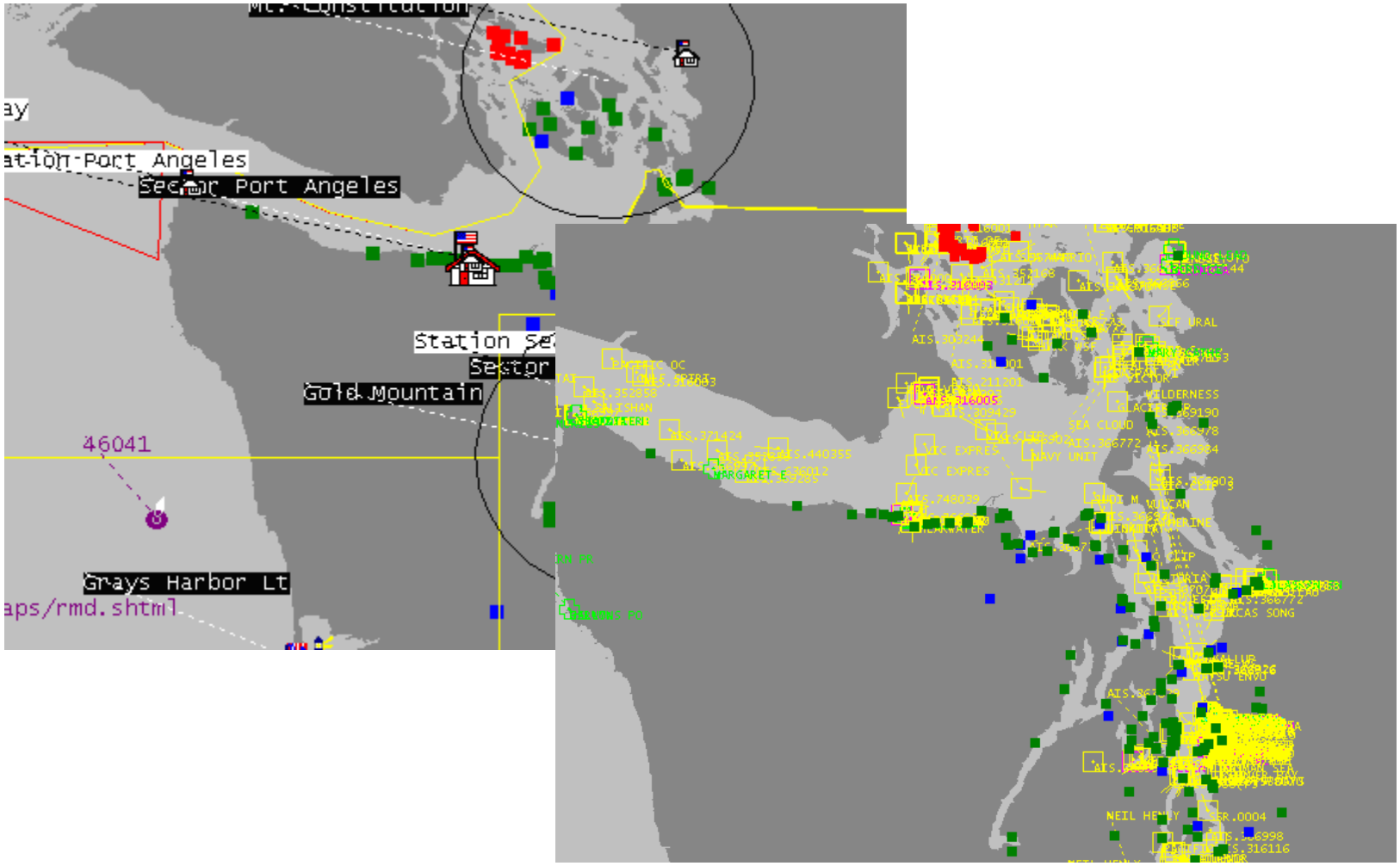


**Matching waterfront citizens, businesses, tribes and facilities directly with CG dispatchers. Continuous information flow and on-call status for CAN members. Interface embedded within CG's common operating picture.**

# Membership maintained in C2PC System



# Common Operating Picture



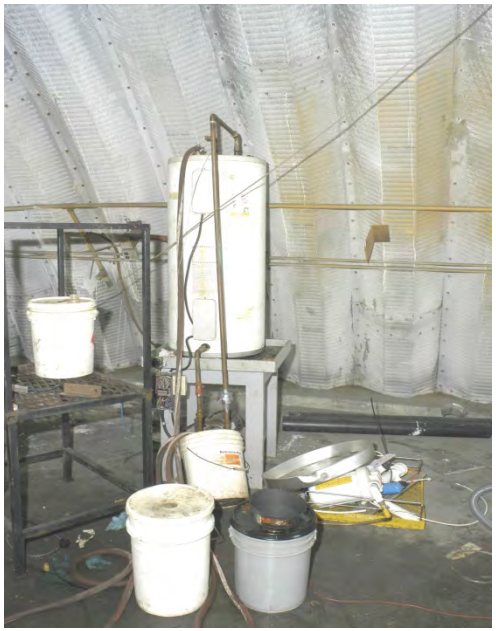
# Skills – Dispatchers working with waterfront citizens

The Coast Guard received a report from the Royal Canadian Mounted Police that a 28-foot Boston Whaler was stolen from Victoria, British Columbia in March 2007. Auto alerts were put out to CAN and the vessel was spotted the following day deep into US waters. It was recovered following a multi-week investigation.

A homeless man steals a 42-foot yacht and flees with a hostage into the vast South Puget Sound. Several CAN members called up and put on watch. Over three hours the vessel is ID'd and a successful arrest is made. Hostage is released safely.

# Skills – Dispatchers working with Waterfront Citizens

A Canadian resident observed small vessel approach shore from nearby island at night, no lights. RCMP Investigation on nearby island revealed MDA lab in pre-production phase.



CAN Members placed on watch in response to a bomb threat to the Tacoma Narrows Bridge; aided USCG & LE in identifying unusual boats or beachgoers in area.

# Skills – Dispatchers working with Waterfront Citizens

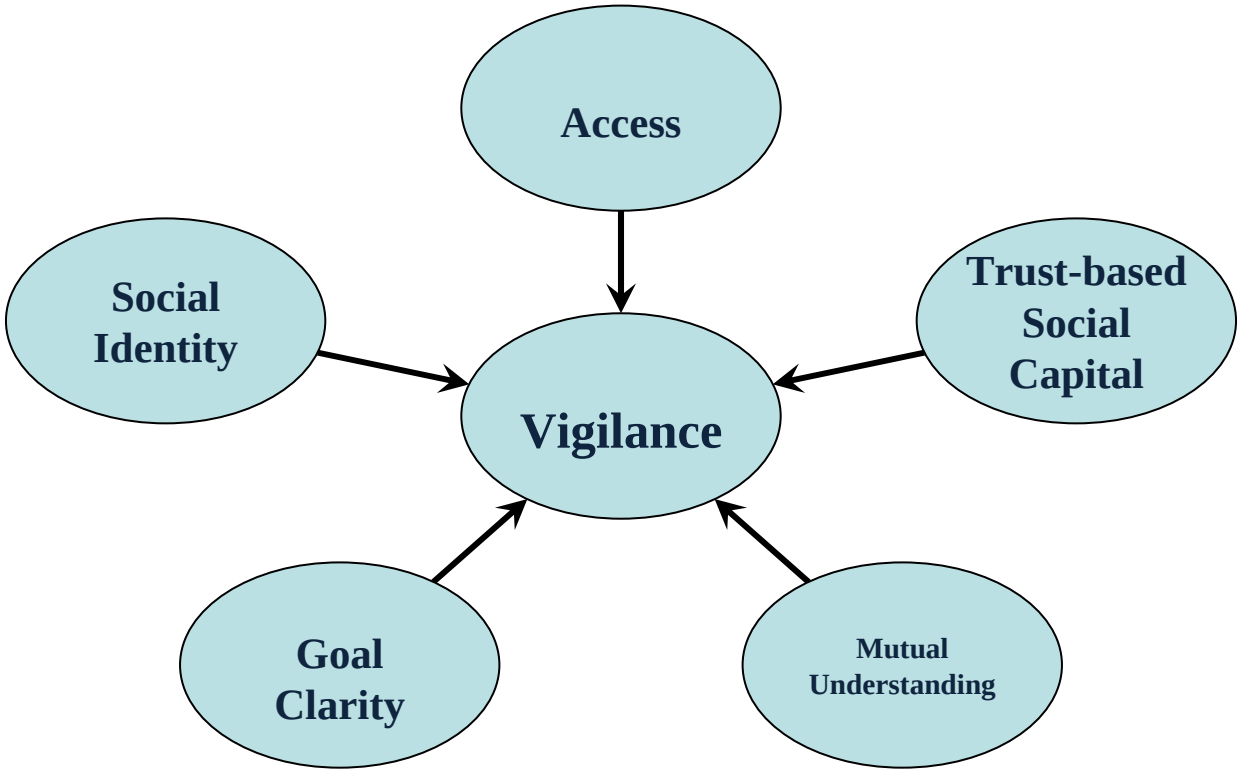
USCG called RCMP requesting assistance in locating vessel that was evading detection. RCMP called upon their CAN and suspect vessel was twice located in transit. Info relayed to USCG who affected a successful apprehension.

A CAN member called in a suspicious cylinder which had washed up on a community beach. The Coast Guard sent investigators to the scene and assessed it to be hazardous. The cylinder was safely removed and disposed of.

# Skills – Dispatchers working with Waterfront Citizens

A Canadian citizen observes decrepit vessel in British Columbia. Aware of Coastal Watch profiles, he calls Coastal Watch reporting number. RCMP able to respond to apprehend 159 PRC migrants on board

# Outcome: Shared Values



# Are you Entrepreneurial?

- Efficiently Gets Proposed Actions Through Bureaucratic Red Tape and into Practice
- Displays an Enthusiasm for Acquiring Skills
- Quickly Changes Course of Action When Results Aren't Being Achieved
- Encourages Others To Take The Initiative for Their Own Ideas
- Inspires Others To Think About Their Work In New and Stimulating Ways
- Devotes Time To Helping Others Find Ways To Improve Our Products and Services
- Goes To Bat for The Good Ideas of Others
- Boldly Moves Ahead with a Promising New Approach When Others Might Be More Cautious
- Vividly Describes How Things Could Be in the Future and What Is Needed to Get Us There
- Gets People to Rally Together to Meet a Challenge
- Creates an Environment Where People Get Excited about Making Improvements

# Questions?

# TechSolutions
# Solutions for First Responders

**Greg Price**
**Director, TechSolutions**
**First Responder Technologies**
**Science and Technology Directorate**
**Department of Homeland Security**

***"Putting First Responders First"***

Homeland Security
Science & Technology

# What is TechSolutions?

The mission of TechSolutions is to rapidly address technology gaps identified by Federal, State, Local, and Tribal first responders

- Field prototypical solutions in 12 months
- Cost should be commensurate with proposal but less than $1M per project
- Solution should meet 80% of identified requirements
- Provide a mechanism for Emergency Responders to relay their capability gaps
  - Capability gaps are gathered using a web site (www.dhs.gov/techsolutions)
- Gaps are addressed using existing technology, spiral development, and rapid prototyping
- Emergency Responders partner with DHS from start to finish

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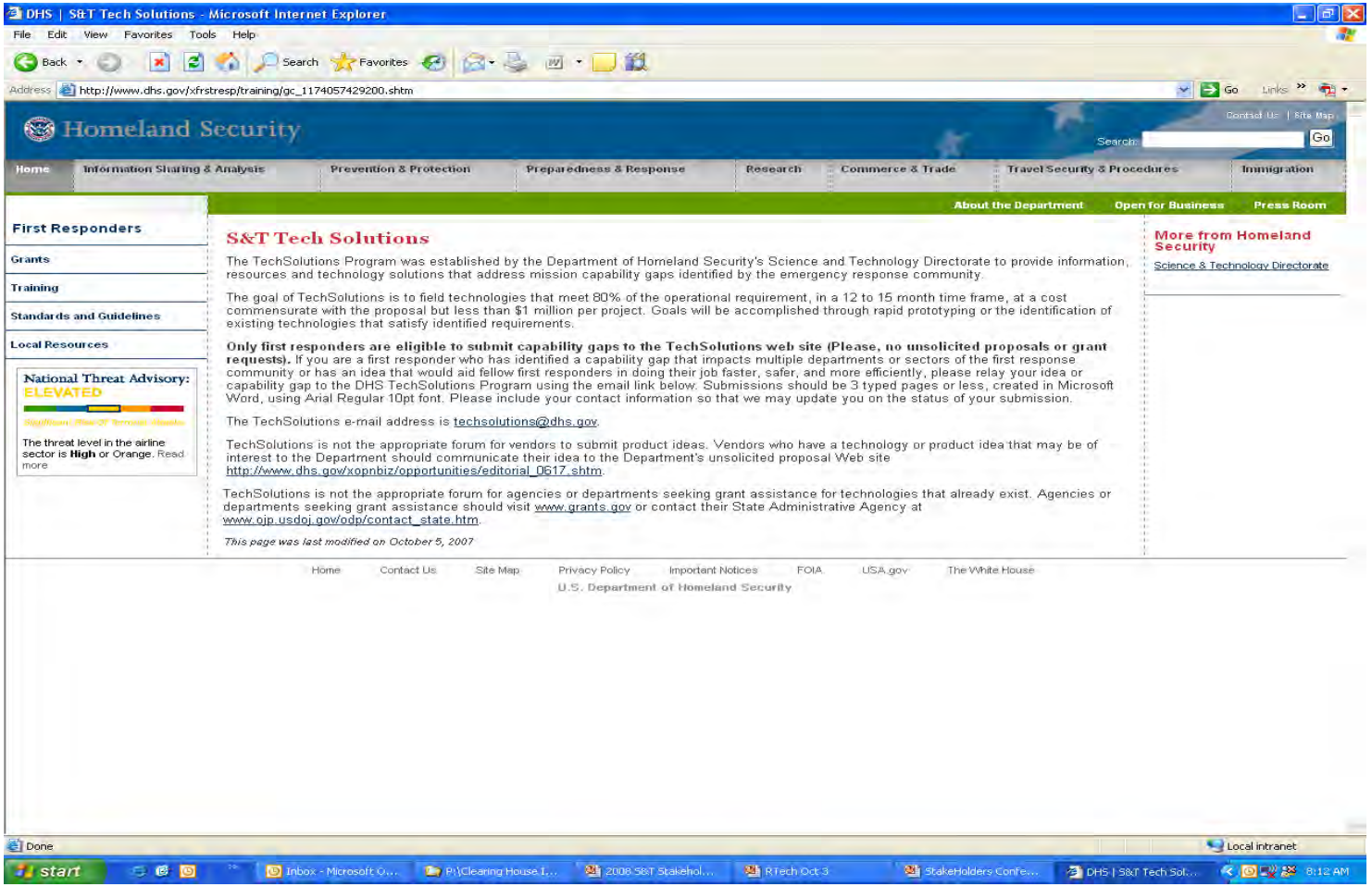
# TechSolutions Web Page

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# TechSolutions Review Process

Start Project

**Request Comes In From First Responder**

2 days

**Request Is Validated**

10 days

**Request is Vetted for Possible Solutions**

3 days

**Review Solution Ideas**

15 days

**Downselect Solution ideas and Request Proposals**

13 days

**Review & Select Winning Proposal**

17 days

**Selected Proposal Funded (60 days from request)**

End Project

**Solution is Demonstrated (12 months from funding)**

**Submitter and Technical Experts involved throughout**

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# TechSolutions Investments

| Customer | Project Name | Status |
|---|---|---|
| Border Patrol | Carrizo Cane | Funded |
| Fire Service | 3-D Personnel Location | Funded |
| EMT | Ocular Scanning | Funded |
| Coast Guard | Biometric Identification | Funded |

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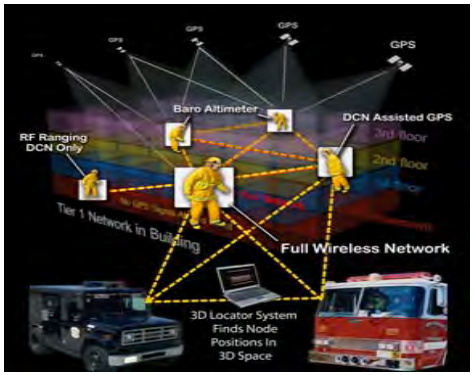
# TechSolutions Investments

## Carrizo Cane Eradication

## 3-D Location




## Ocular Scanning

## Biometric Identification

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# Technologies Under Consideration

**Next Generation Breathing Apparatus**

**Fire Ground Compass**

**Interoperable Communications**

**Vital Sign Monitoring**

**Vehicle Mounted Chem/Bio Sensor Detection**

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# Questions?

?

Homeland Security

# Homeland Security

## Science and Technology

*Protecting you, Protecting U.S.*

# SAFETY Act

The Support Anti-terrorism by Fostering Effective Technologies Act of 2002

Silvia Cabrera
Director
Office of SAFETY Act Implementation (OSAI)
Science and Technology Directorate
Department of Homeland Security

*From Science and Technology... Security and Trust*

Homeland Security

# SAFETY Act Summary:

The Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act) was enacted as part of the Homeland Security Act of 2002

Intended to facilitate the development and deployment of effective anti-terrorism technologies by creating systems of "risk management" and "litigation management"

Protections apply **only** to claims arising out of, relating to, or resulting from an **Act of Terrorism**

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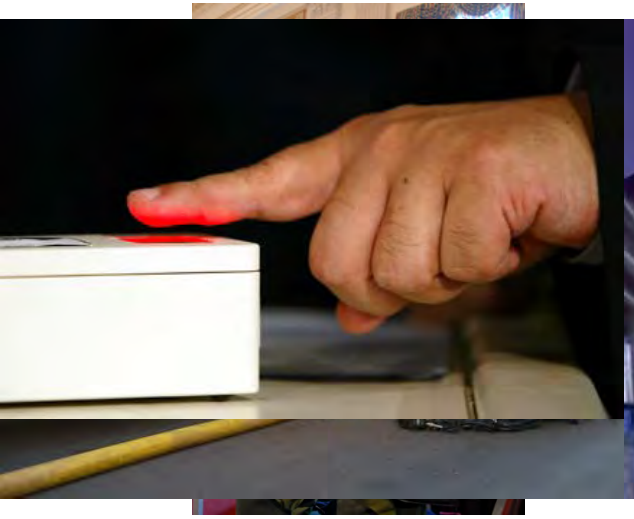
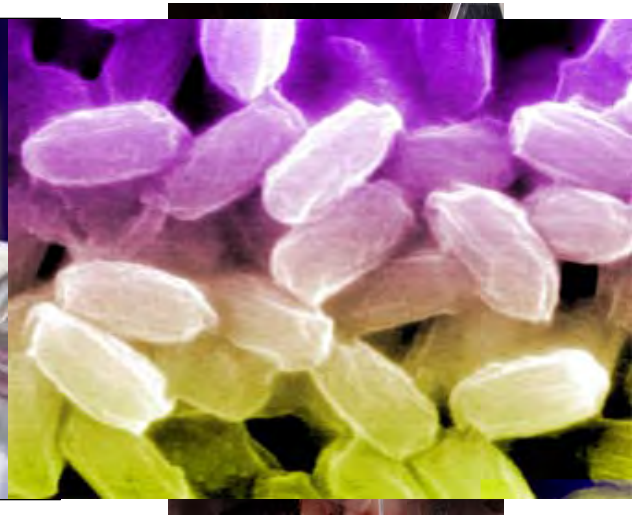
# What is considered an “Anti-Terrorism Technology?”

- Any technology that is designed, developed, modified or procured for preventing, detecting, identifying, or deterring acts of terrorism or limiting the harm such acts might otherwise cause harm.





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# What is Eligible for SAFETY Act Protections?

**The SAFETY Act liability protections apply to a vast range of technologies, including:**

- Products
- Services
- Software and other forms of intellectual property

**Examples of eligible technologies:**

- Threat and vulnerability assessment services
- Detection Systems
- Blast Mitigation Materials
- Screening Services
- Sensors and Sensor Integration
- Threatening Object Detectors
- Decision Support Software
- Security Services
- Crisis Management Systems

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# Timeline of Review Process:

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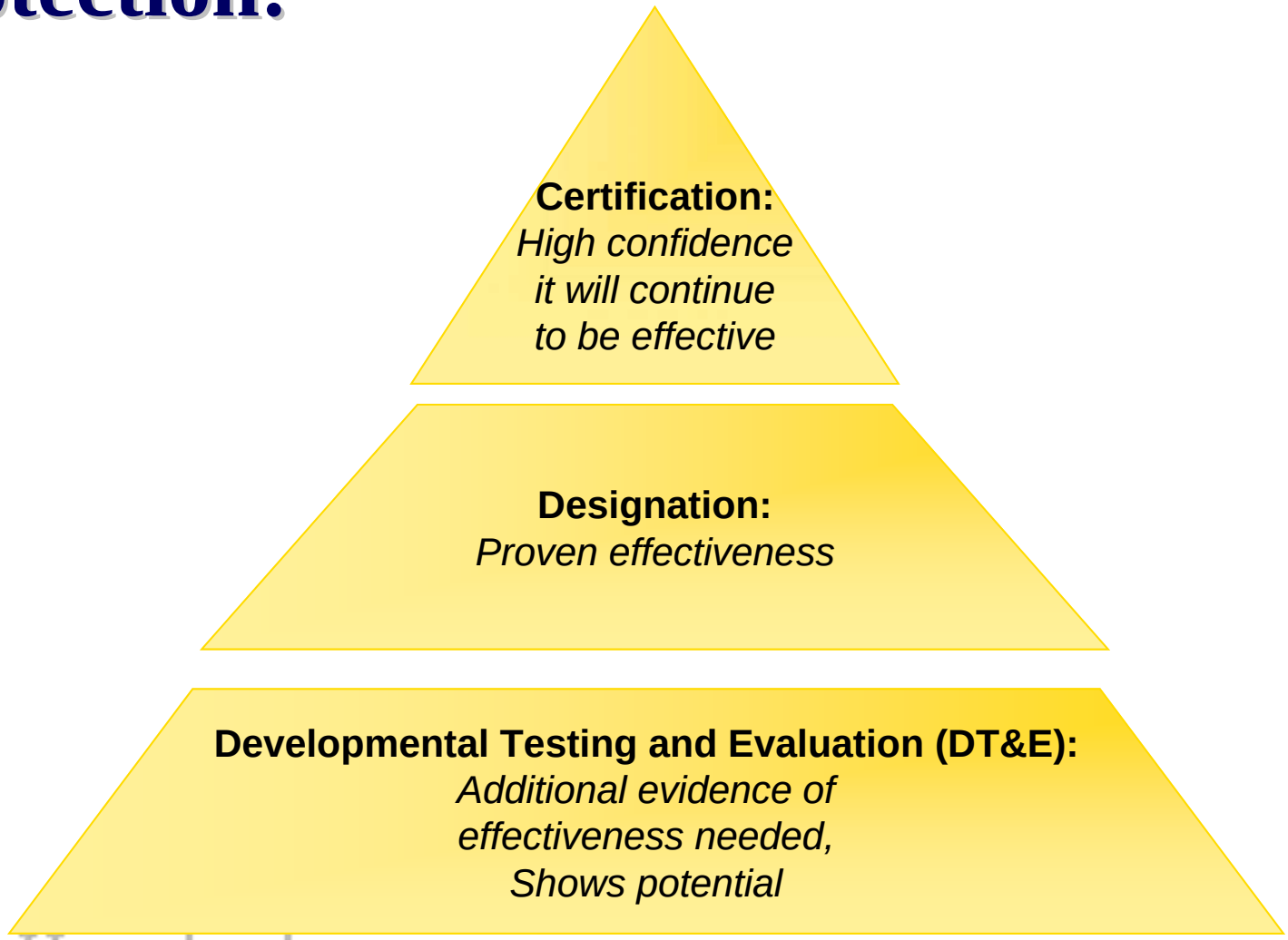
# The Different Levels of SAFETY Act Protection:

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# SAFETY Act Designation Benefits:

- Liability = Insurance required by DHS
- Exclusive action in Federal court
- No joint and several liability for non-economic damages
- No punitive damages or prejudgment interest
- Plaintiff's recovery reduced by amounts from collateral sources

Homeland Security

# Benefits of SAFETY Act Certification:

*In addition to the benefits provided under Designation, Certification allows a Seller to:*

- Assert the Government Contractor Defense for claims arising from acts of terrorism
- Certificate of Conformance issued to the Seller
- Be placed on DHS's Approved Products List for Homeland Security

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# SAFETY Act Protections Extend to Users

"Such cause of action [lawsuit] may be brought only against the Seller of the QATT [Qualified Anti-Terrorism Technology] and may not be brought against the buyers, the buyers' contractors, downstream users of the QATT, the Seller's suppliers or contractors, or any other person or entity…"

- Preamble to SAFETY Act Regulations, 6 CFR Part 25, at 33150.

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# Criteria Per SAFETY Act Regulations:

## Technical Criteria

- Prior U.S. Government use (Demonstrates effectiveness)
- Availability for immediate deployment
- Risk exposure if the Technology is not deployed
- Evaluation of Technology's capability to substantially reduce risks of harm
- Technology's effectiveness in defending against Terrorism
- ATT determination made by Federal, State, or Local officials

## Economic Criteria

- Third party liability risk exposure to the Seller or other provider of the technology
- SAFETY Act risk management protections are strongly necessary for deployment

✓ *We adopt the flexible approach*

Homeland Security

# SAFETY Act Application's Effectiveness criteria?

- Successful testing in operational environment
  - ➢ Operational testing
    - ✓ Evidence of performance metrics, including:
      - o Probability of Detection
      - o False Positive and False Negative Rates
      - o Limits of Detection (and why that limit is relevant)
      - o Interferrents
      - o Maintenance and Training
- Documented performance of past deployments
- Appropriate domain expertise
- Favorable In/external audits
- Favorable customer feedback
- Proven repeatability
- Documented quality assurance plans

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# Proprietary Data is Protected

- Certified and accredited database that conform to DHS information security standards
- All application reviewers are screened for conflicts of interests, sign conflict of interest statements for each application they review, and sign general nondisclosure agreements

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# SAFETY Act Reviewers?

- Three Technical Reviewers and two Economic Reviewers per application
- Approximately 420 Subject Area Experts (SMEs)
- From the Federally Funded R&D Centers (FFRDCs), non-profits, Federal Government, Federal & National Labs, and Academia
- SMEs experienced in:

| | | |
|---|---|---|
| ➢Cyber | ➢Chemical | ➢Rad/Nuc |
| ➢Economic | ➢Biological | ➢Human |
| | ➢Explosive | ➢Services |

Homeland Security

# Examples of SAFETY Act Approved Technologies:

## Vulnerability Assessments

- Threat and Vulnerability Assessment
- Risk Mitigation Services
- Risk Auditing and Assurance Services
- Event Security Management Services

## Security Services

- Screening of persons and packages
- Physical security guard staffing and parameter services
- Installation of security equipment for the detection of hazardous threats
- Systems to detect CBRNE threats
- Systems that provide intrusion detection

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# Examples of SAFETY Act Approved Technologies (cont.) :

## Detectors / Sensors / Systems

- Devices for early warnings of chem/bio agent release
- Sensors that identify chem/bio contaminants in water supplies
- Systems that detect toxic industrial chemicals & chemical warfare agents
- System that monitors the air for hazardous substances

## Personnel Protection Technologies

- Receptacles designed to withstand explosions
- Devices designed to suppress damage from explosive devices, fires, etc.
- Protective materials that absorb energy and protect assets from explosive damage

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# Examples of SAFETY Act Approved Technologies (cont.) :

## Crisis Management

- Mass public notification system in the event of terrorism
- Incident command software system for disaster management / public safety
- Real-time monitoring system that collects data for recovery efforts

## And Many More…

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# General Vocabulary

- *Similar use*: Deployments that are similar to the way in which your technology is intended to be used as an anti-terrorism technology.
- *Customer testimonials*: Statements from customers that detail how your technology has been utilized and how effective it has been in those deployments.
- *Standards*: Prescribed set of rules, conditions or requirements concerning definition of terms, classification of components, specification of materials, performance or operations, delineation of procedures, or measurement of quantity and quality in describing materials, products, systems, services, or practices.*

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* National Standards Policy Advisory Committee

# Services Vocabulary

- *Process*: How the service works, what best practices/ standards apply, what type of QA is in place.
- *Best Practices:* An operation which is most appropriate under the circumstances, esp. as *considered acceptable or regulated in business*; a technique or methodology that, through experience and research, has *reliably* led to a desired or optimum result.

Homeland Security

# Products Vocabulary

- *Developmental testing*: Controlled conditions. The product could still be under-going modifications.
- *Operational testing*: In an environment that closely mimics the environment in which the product will be used. Final configuration.
- *Measures and Metrics*: A **measure** is an operation for assigning a number to something. A **metric** is our interpretation of the assigned number.
  - E.g.,
    - Measurement = 1 $mg/m^3$
    - Metric = Lower limit of Detection

- Designation

Homeland Security

# Item D1: Application Type

- Initial Filing
- Filing Following a Pre-application
- Filing a Resubmission
- Public Web site listing preference

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# Item D2: Expedited Review

- Generally for pending procurements, needed for RFP submissions, or SAFETY Act-dependent deployment
- An expedited review request should include:
  - Deploying entity
  - Contract start date
  - A point of contact to verify this information or a letter on the deploying agency's letterhead with the contract start date or outlining reason why the deployment is delayed
- The Director of OSAI determines if an expedited review is warranted.

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# Item D3: Registration Information

- Please make sure your registration information is current.
- Within your registration status (different form), please indicate the primary and secondary point of contact from your company and indicate whether e-mail communication is allowed.

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# Item D4: Technology/Company Profile

- Technology name
- Give a brief description of your company including:
  - Company name
  - State of incorporation
- Other useful information:
  - Company size (number of employees)
  - Manufacturing facilities
  - Company headquarters (principal place of business)
- Include a brief non-proprietary description of your technology

Homeland Security

# Item D5: Nature of your technology

Executive Summary

- What do you sell?
- What are the major steps required with the deployment of your technology?
- How does your technology counter terrorism?
- What is your customer responsible for?
- The answer to this question is a top level overview. You can provide more detailed information about each step or component in response to Item D9.

Homeland Security

# Item D6: Past Sales

- It is important to identify any prior use of your technology.
- Only include imminent users if contracts are in place.
- Include testing agencies.
- When identifying past or future users and/or testing agencies, please include the following:
  - Deploying entity
  - Description of how the technology was used
  - Duration of use
  - Contract status (pending, complete, in-progress)
  - Points of contact who will verify the above

Homeland Security

# Item D7: Additional Sellers

- Are there any additional Sellers of your technology?
- Provide states of incorporation for all Sellers listed here.

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# Item D8: Earliest Date of Sale

- When did you start selling this technology as an *anti-terrorism technology*?
- The earliest date of sale can be:
  - Earlier than the date of application.* However, a justification for this date should be provided.
    - Stable, static technology
    - Otherwise would require purely bureaucratic contract changes
  - The date of the application
  - A future date associated with a pending contract

*Act-of-terrorism-free retroactive liability protection

Homeland Security

# Item D9: Technology Description

- Build on what you supplied in Item D5
- Kit has ~2 pages of guidance
- What is each component (or sub-process) of your technology?
- Why are these components (or sub-processes) important?
- Services
  - Hiring Practices
  - Training methods
- Products
  - Installation
  - Site Acceptance Testing

Critical: This will define the scope of your coverage!

Homeland Security

# Item D10: Deployment and Operation

- Step us through a typical deployment of your technology
- What is invariable from deployment to deployment?
  - Products: how do you ensure that each time you deploy your technology, the same technical metrics are met?
  - Services: what quality control do you utilize to ensure that each deployment uses the same procedures or that all employees are trained the same?
- What is customized for each deployment?

Homeland Security

# Item D11: Readiness for Sale

- When could you sell your fully developed technology?
- Products
  - Has/when will efficacy be determined?
  - Do you have a manufacturing facility?
  - Are you modifying existing facilities?
  - Do you have quality control methods in place?
- Services
  - Do you have practices and procedures in place for all deployments?
  - Do you have a staffing procedure in place?
  - Do you have training materials ready?

Homeland Security

# Item D12: Magnitude of Risk

- What does your technology protect the public from?
- What are the likely consequences of a successful attack of that sort (estimates)?
  - Injury
  - Property
  - Economic loss
  - Loss of life
  - Other harm (including financial)

Homeland Security

# Item D13: Impact of Coverage

- How will the protections of the SAFETY Act affect your deployment plans?
  - If SAFETY Act protection is obtained, our business plan for the Technology is …
  - If SAFETY Act protection is not obtained, our business plan for the Technology is …

Homeland Security

# Item D14: Effectiveness and Utility

- **Products**
- Performance metrics and test data
  - Supporting information needed
  - Narrative explanations are good; test reports and operational data are better.
- Developmental testing
  - Who tested?
  - What was tested?
  - How was it tested?
  - What happened?
  - What changed?

Homeland Security

# Item D14: Effectiveness and Utility

- **Products, continued:**
- Operational testing
  - Who?
  - What?
  - Where?
  - What happened?
- Past use
  - Customer testimonials
  - Points of contact

Homeland Security

# Item D14: Effectiveness and Utility

- **Services**
- What is your process?
- What is your expertise?  What is the expertise of your employees?
- What is your TRAINING program?
- What is your past experience?  Have you ever been internally or externally audited?
- Quality Control/Quality Assurance
- Customer testimonials

Homeland Security

# Item D15: Other information

- What else should we know about you or your technology?
- Have people used your technology successfully?
- Have you won any awards for your technology?
- Have your processes received any certifications (ISO, CMMI, etc.?)

- Provide a Table of Contents

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# Items D16-17

- Insurance and Financials

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# Item D16: Insurance Data

- Describe your current insurance policy(ies) that would satisfy compensable 3rd party claims arising from, relating to or resulting from an Act of Terrorism.
- For example:
  - General liability
  - Professional liability
  - Product liability
  - Stand-alone terrorism

Homeland Security

# Item D16.1: Insurance Data

- **For each policy (a-l):**
- Primary and additional named insured
- Type of policy
- Policy dates (start – end)
- Insurer
- Per-Occurrence, Aggregate Limits and Premiums
- Deductibles or Self-insured retentions
- Pertinent exclusions and cancellation terms or limits that potentially dilute or eliminate the availability of coverage
- Type and limits of terrorism coverage (e.g., TRIA)
- Dedicated limit or shared limit

Homeland Security

# Item D16.2: Unavailability of Insurance

- When securing quotes, ask the broker or insurer to assume that SAFETY Act protection will be obtained.
- If you cannot obtain insurance quotes for the Technology, please indicate the reasons and provide letters of declination on your broker/insurer letterhead.
- If you believe that the cost of insurance premiums would "unreasonably distort the price of the Technology"…
  - Talk to us

Homeland Security

# Item D16.3: Insurance P.O.C.

- Point of Contacts
  - Risk Manager
  - Insurance Broker
  - In-House Counsel/Attorney
  - Insurance Agent

Homeland Security

# Item D16.4: Technology Revenue

- Current year Technology revenue and cost
- Two-year projected Technology revenue and cost
- Any additional financial information that you believe is material to your application
- When projecting revenue, assume SAFETY Act protection is awarded

Homeland Security

# Item D16.5: Deployment

- Present a plausible scenario in which your Technology could be the proximate cause of 3rd party claims in the event of an Act of Terrorism
  - Estimate injuries, deaths and economic damages that would arise under those claims
- Big Picture:
- What liability do you face during deployment?
- Why do you need SAFETY Act to deploy?

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# Item D17: Financial Data

- Your most recent financial statements
  - income statement
  - balance sheet
  - statement of cash flows
- If the primary named insured for your insurance program is a parent, provide their most recent financial statements (income statement, balance, sheet, statement of cash flows)
- Any additional financial information that you believe is material

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- Developmental Test & Evaluation Designation

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# A Different Kind of Application

- For technologies that require more testing to understand the capabilities of the technology, but cannot be tested without being in the public sector and exposed to potential liability
- By definition, convincing efficacy data may not exist yet
- Requires some evidence that:
  - The technology could work (TE10)
  - There is a test scenario/deployment opportunity that will allow you to gather more information (TE6)

Homeland Security

# Items TE 1-4

- Largely same as Designation

Homeland Security

# Item TE 5: Specification of your Technology

- Equivalent to Item D9, and just as critical
- Products/Services
  - What do you sell?
  - What is your customer responsible for?
  - What is each component (sub-process) of your technology?
    - Why are these components important?
- Services
  - Hiring Practices, Training, Methods
- Products
  - Installation, Site Acceptance Testing

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# Items TE 6-7: Nature of test/CONOPS

- Where will you test? Have you made arrangements with a test agency or private company to deploy your Technology for information gathering purposes?
- How will you deploy your technology during test? Do you have standard operating procedures or will you be writing these during the course of the test?
- Who will operate the technology during testing?
- What will you test (metrics)? What do you expect the outcome of testing to be?
- What are the steps required to deploy your technology?

We will be looking for a thoroughly outlined test plan!

Homeland Security

# Item TE 8: Magnitude of Risk

- What does your technology protect the public from?
- What are the likely consequences of a successful attack of that sort (estimates)?
  - Injury
  - Property
  - Economic loss
  - Loss of life
  - Other harm

Homeland Security

# Item TE 9: Impact of Coverage

- How will the protections of the SAFETY Act affect your testing plans?
  - If SAFETY Act protection is obtained, our business plan for the Technology is …
  - If SAFETY Act protection is not obtained, our business plan for the Technology is …

Homeland Security

# Item TE 10: Effectiveness and Utility

- What testing has been done in the past?
  - Developmental testing?
  - Operational testing?
  - What did you learn about your technology's
    - Quality, specifications, repeatability, …
- POCs that **will** substantiate
- Or, is this a first test?
- What are the expected outcomes of the upcoming test?
  - What will you measure?
  - What will that tell you?
  - Will more tests be required?

Homeland Security

# Item TE 11: Other information

- Similar to Designation application: what else should we know about you or your Technology?

Homeland Security

# Items TE 12-13: Insurance/Financial

- A DT&E application requires the same insurance and financial information as a full application.  Your application cannot be processed without this information!

Homeland Security

# Additional SAFETY Act Information

**Online:** www.safetyact.gov

- FAQs
- Help Topics
- Help Desk: Online form for questions requiring an individual response

**Email:** helpdesk@safetyact.gov

**Toll-Free:** 1-866-788-9318

Homeland Security

Homeland
Security

Homeland
Security

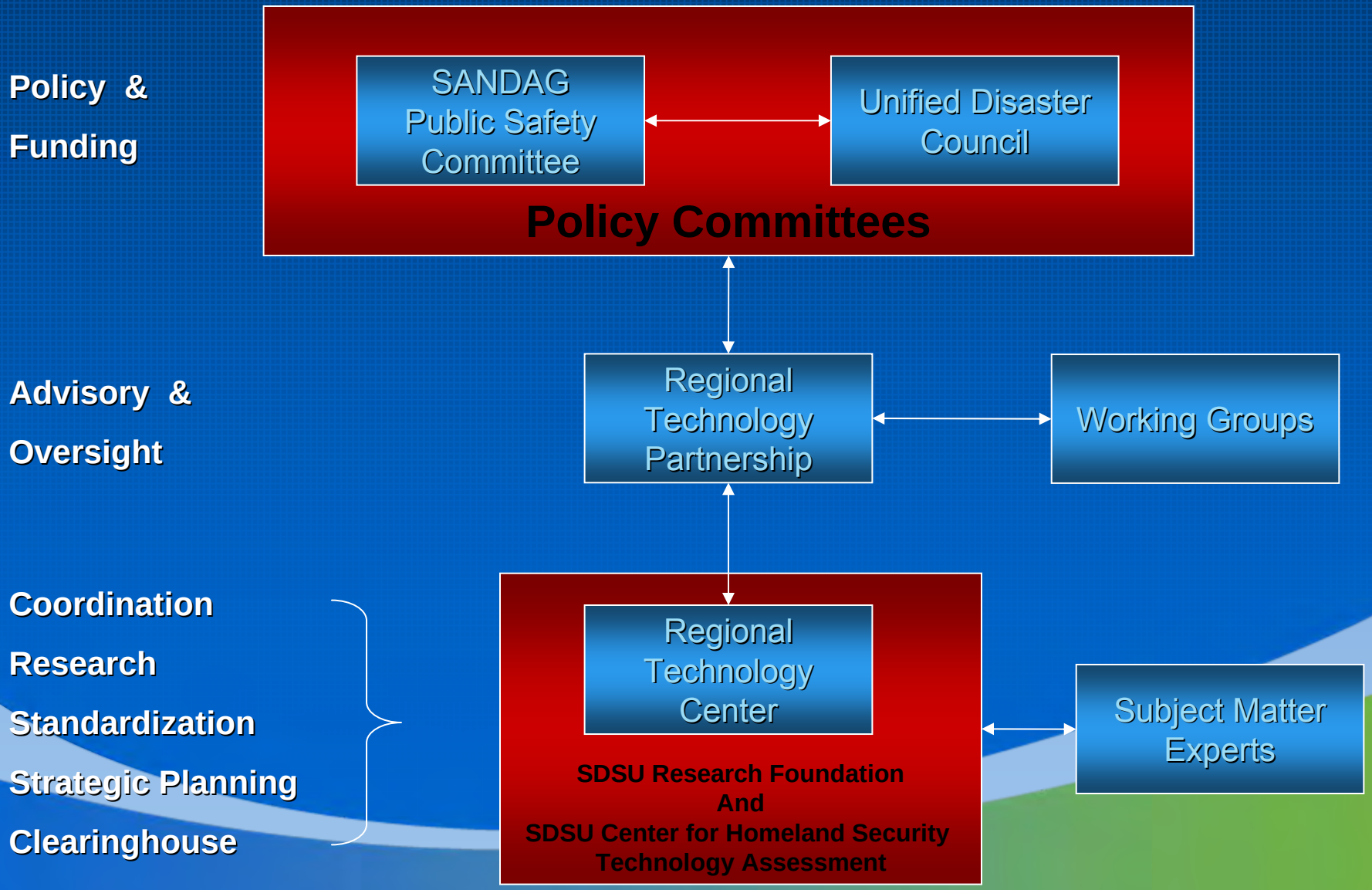
# San Diego GIS Response During the 2007 Firestorm

Paul Hardwick
Regional GIS Project Manager
SDSU Research Foundation
Regional Technology Center for Homeland Security

# *Center for Homeland Security*

- Interoperable GIS
- Interoperable Communications
- Technology Clearinghouse

# Governance Structure



# Office of Emergency Services

# *Geospatial Database*

- Critical Infrastructure
- Situational Awareness
- Common Operating Picture
- Information Integrator

Geospatial technology allows for multiple sets of information to be analyzed, modeled, and correlated in order to find patterns that can lead to improved strategies for prevention, response, and mitigation.

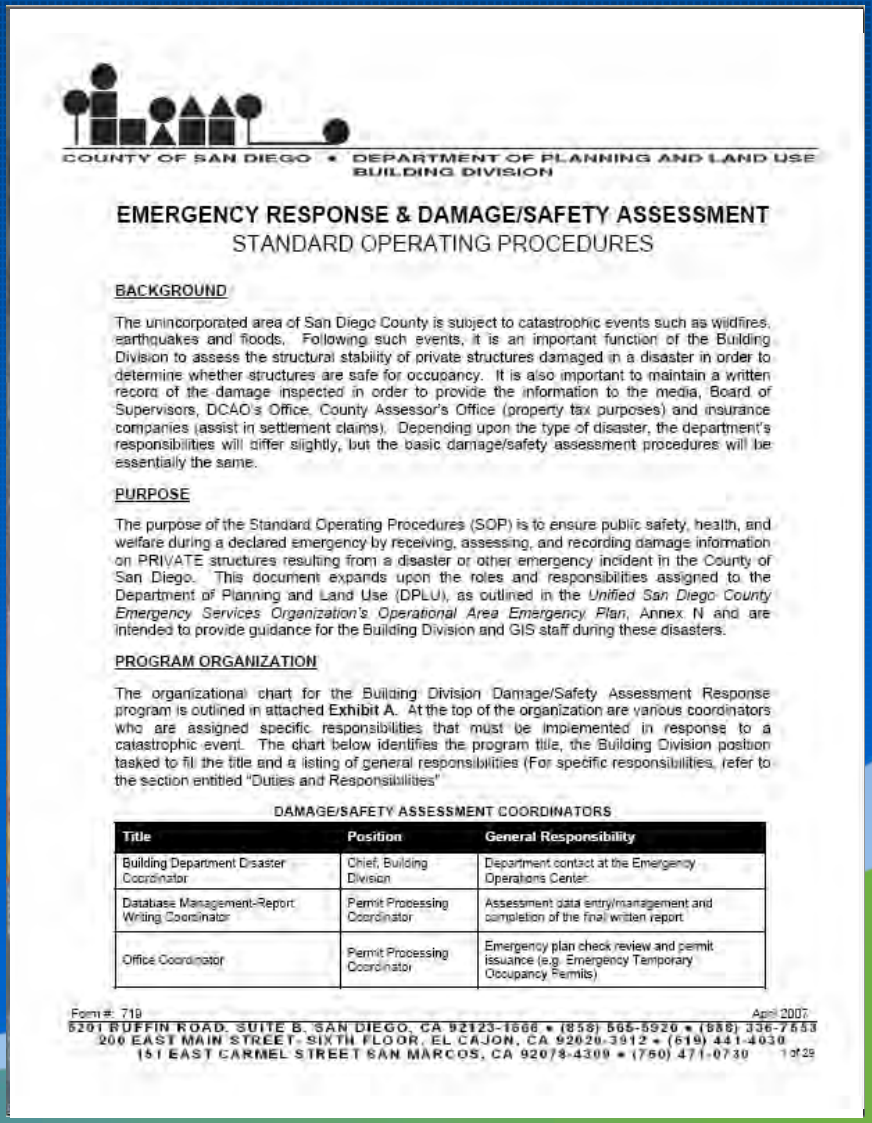
# 2003 Firestorm

# 2003 Lessons Learned

- Established GIS positions within the County Office of Emergency Services for day to day operations and EOC response during an incident
- Maintain a local geospatial data instance
- Identified key on-line mapping resources from various State and Federal agencies that could provide key information during an incident
- Created mapping templates
- Trained County GIS Analyst as a Geographic Information System Specialist for incident response

# GIS SOP

- National Wildfire Coordination Group www.nwcg.gov
- Geographic Information Systems Emergency Standards of Operation
- Damage Assessment Standard Operating Procedures



COUNTY OF SAN DIEGO • DEPARTMENT OF PLANNING AND LAND USE
BUILDING DIVISION

**EMERGENCY RESPONSE & DAMAGE/SAFETY ASSESSMENT**
STANDARD OPERATING PROCEDURES

**BACKGROUND**

The unincorporated area of San Diego County is subject to catastrophic events such as wildfires, earthquakes and floods. Following such events, it is an important function of the Building Division to assess the structural stability of private structures damaged in a disaster in order to determine whether structures are safe for occupancy. It is also important to maintain a written record of the damage inspected in order to provide the information to the media, Board of Supervisors, DCAO's Office, County Assessor's Office (property tax purposes) and insurance companies (assist in settlement claims). Depending upon the type of disaster, the department's responsibilities will differ slightly, but the basic damage/safety assessment procedures will be essentially the same.

**PURPOSE**

The purpose of the Standard Operating Procedures (SOP) is to ensure public safety, health, and welfare during a declared emergency by receiving, assessing, and recording damage information on PRIVATE structures resulting from a disaster or other emergency incident in the County of San Diego. This document expands upon the roles and responsibilities assigned to the Department of Planning and Land Use (DPLU), as outlined in the *Unified San Diego County Emergency Services Organization's Operational Area Emergency Plan*, Annex N and are intended to provide guidance for the Building Division and GIS staff during these disasters.

**PROGRAM ORGANIZATION**

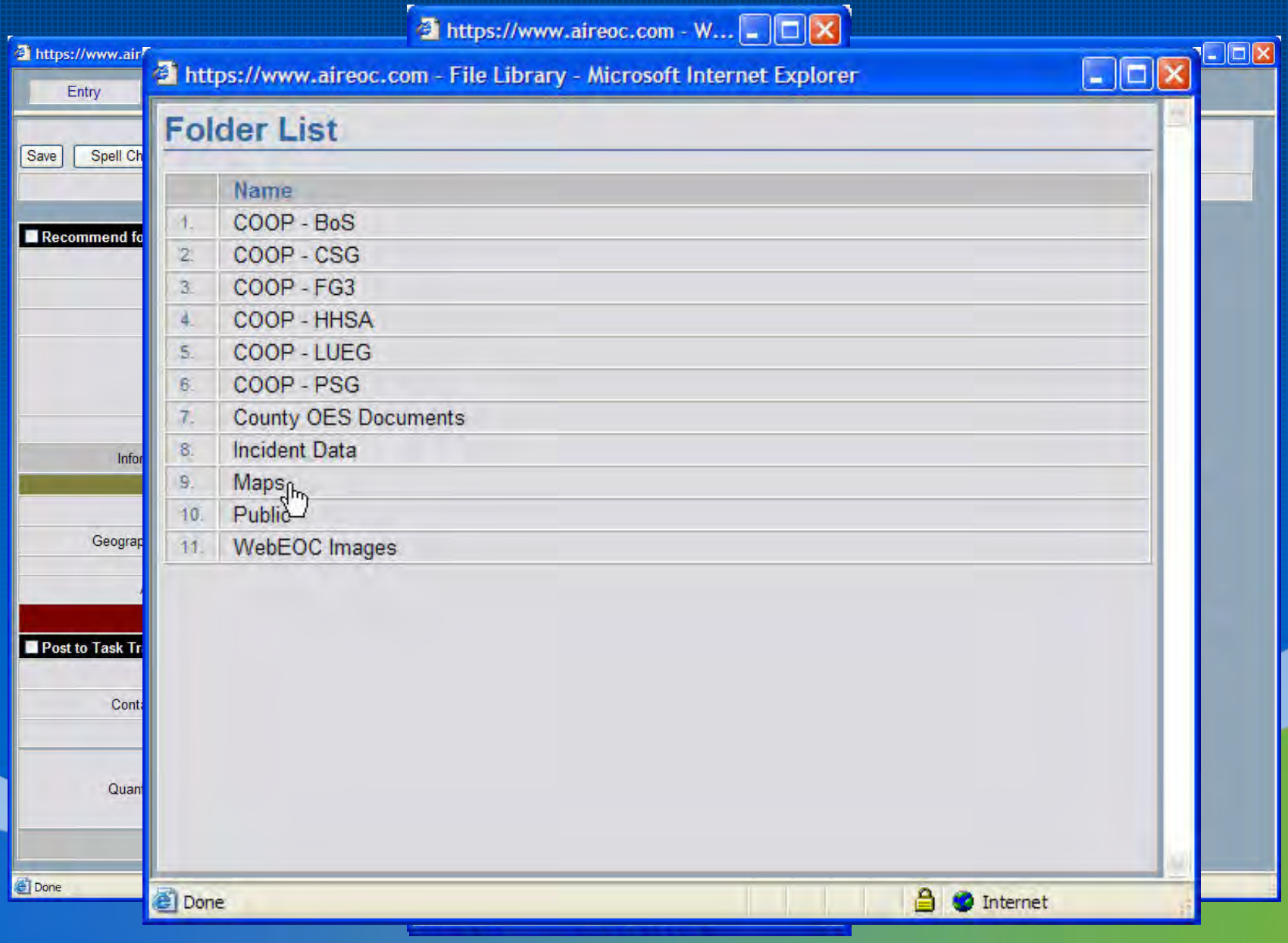
The organizational chart for the Building Division Damage/Safety Assessment Response program is outlined in attached **Exhibit A**. At the top of the organization are various coordinators who are assigned specific responsibilities that must be implemented in response to a catastrophic event. The chart below identifies the program title, the Building Division position tasked to fill the title and a listing of general responsibilities (For specific responsibilities, refer to the section entitled "Duties and Responsibilities"

DAMAGE/SAFETY ASSESSMENT COORDINATORS

| Title | Position | General Responsibility |
|---|---|---|
| Building Department Disaster Coordinator | Chief, Building Division | Department contact at the Emergency Operations Center |
| Database Management-Report Writing Coordinator | Permit Processing Coordinator | Assessment data entry/management and completion of the final written report |
| Office Coordinator | Permit Processing Coordinator | Emergency plan check review and permit issuance (e.g. Emergency Temporary Occupancy Permits) |

Form #: 719 April 2007
5201 RUFFIN ROAD, SUITE B, SAN DIEGO, CA 92123-1666 • (858) 565-5920 • (888) 336-7553
200 EAST MAIN STREET- SIXTH FLOOR, EL CAJON, CA 92020-3912 • (619) 441-4030
151 EAST CARMEL STREET SAN MARCOS, CA 92078-4309 • (760) 471-0730 1 of 29

# WebEOC


https://www.aireoc.com - W...
https://www.aireoc.com - File Library - Microsoft Internet Explorer
Folder List
Name
1. COOP - BoS
2. COOP - CSG
3. COOP - FG3
4. COOP - HHSA
5. COOP - LUEG
6. COOP - PSG
7. County OES Documents
8. Incident Data
9. Maps
10. Public
11. WebEOC Images
Done
Internet
Entry
Save
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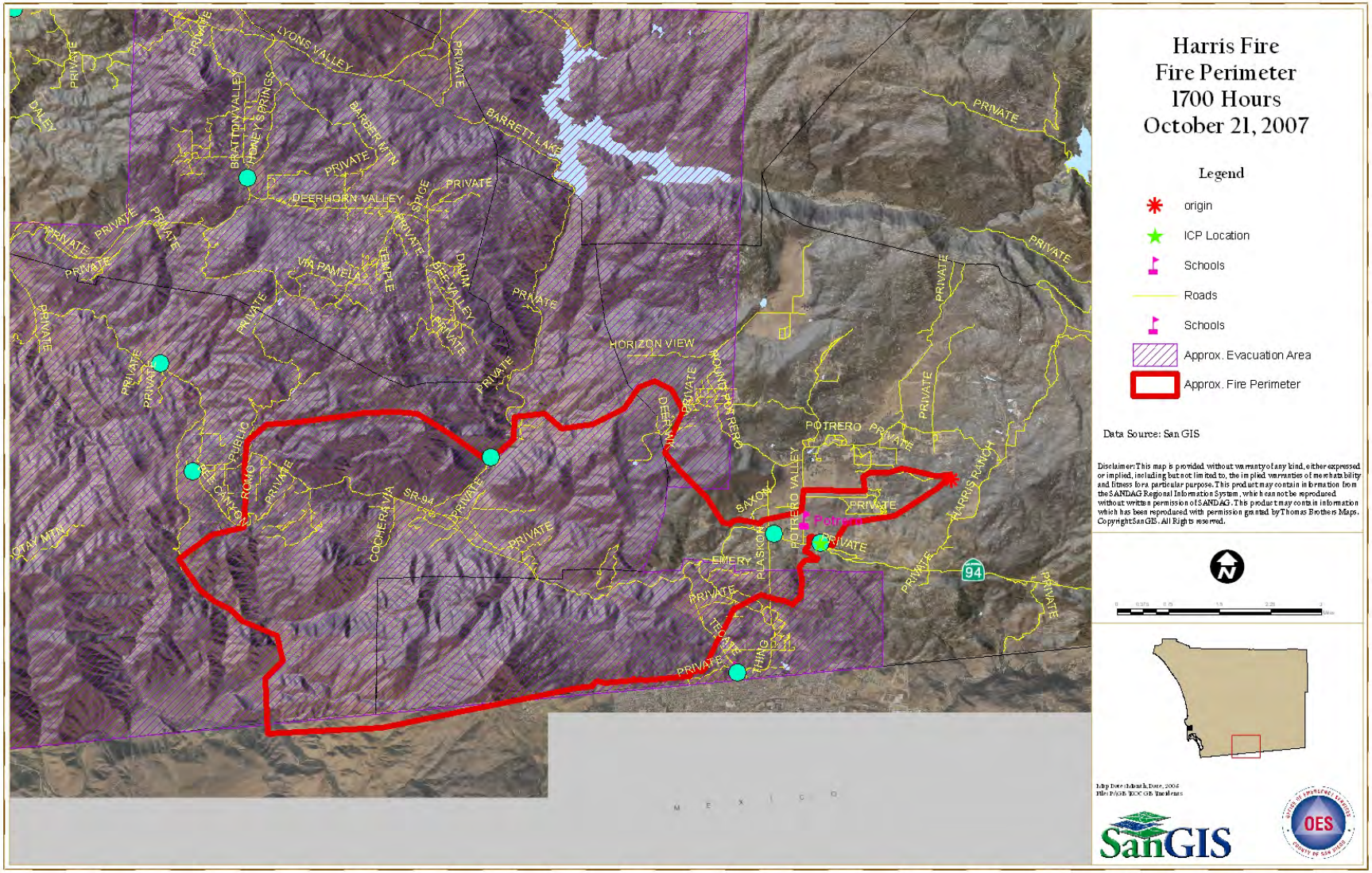
Recommend fo
Post to Task Tr
Done

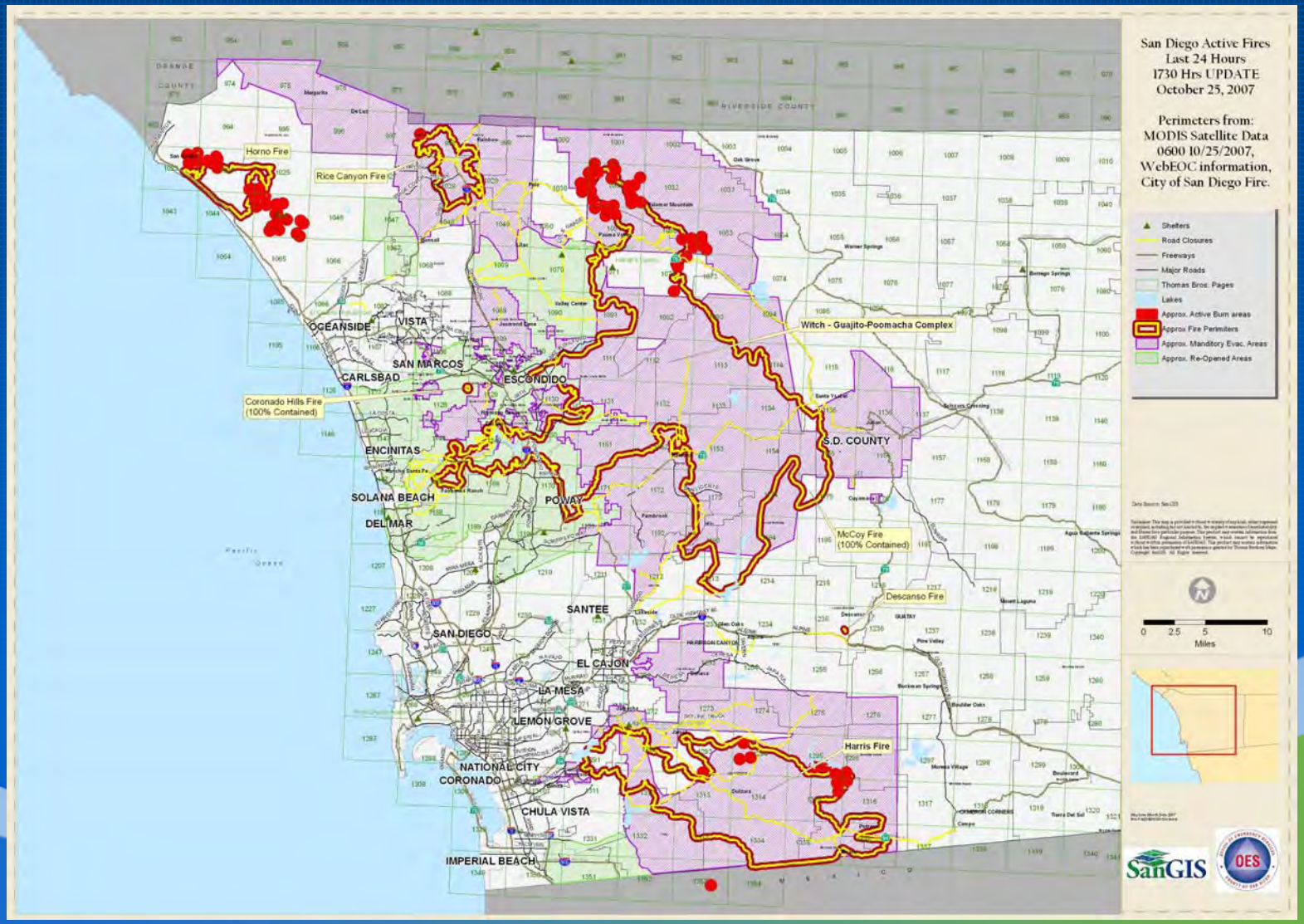
# 2007 Fires

# 2007 Fires



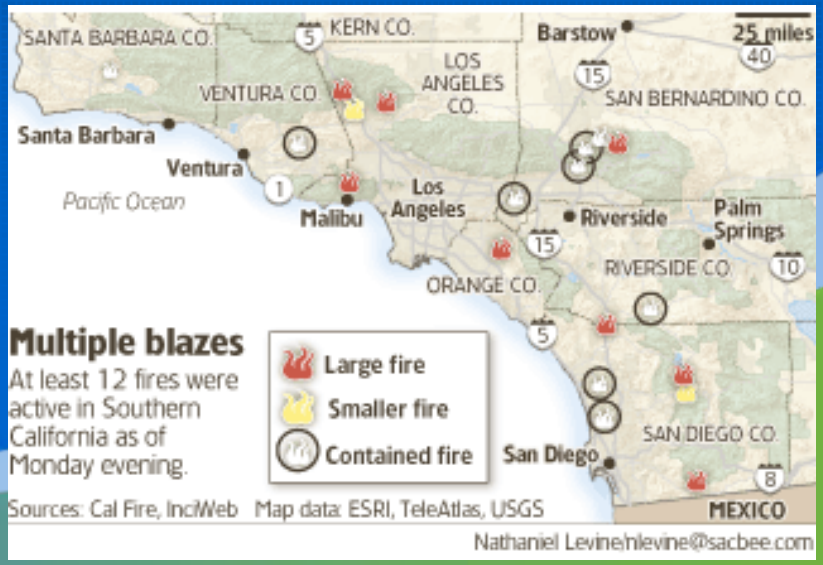
Harris Fire
Fire Perimeter
1700 Hours
October 21, 2007
Legend
origin
ICP Location
Schools
Roads
Schools
Approx. Evacuation Area
Approx. Fire Perimeter
Data Source: San GIS
Disclaimer: This map is provided without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchatability and fitness for a particular purpose. This product may contain information from the SANDAG Regional Information System, which can not be reproduced without written permission of SANDAG. This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps. Copyright San GIS. All Rights reserved.
LYONS VALLEY
BARRETT LAKE
DEERHORN VALLEY
HORIZON VIEW
POTRERO
POTRERO VALLEY
HARRIS RANCH
COCHERA VIA
SR-94
94
M E X I C O
SanGIS
OES

# 2007 Fires

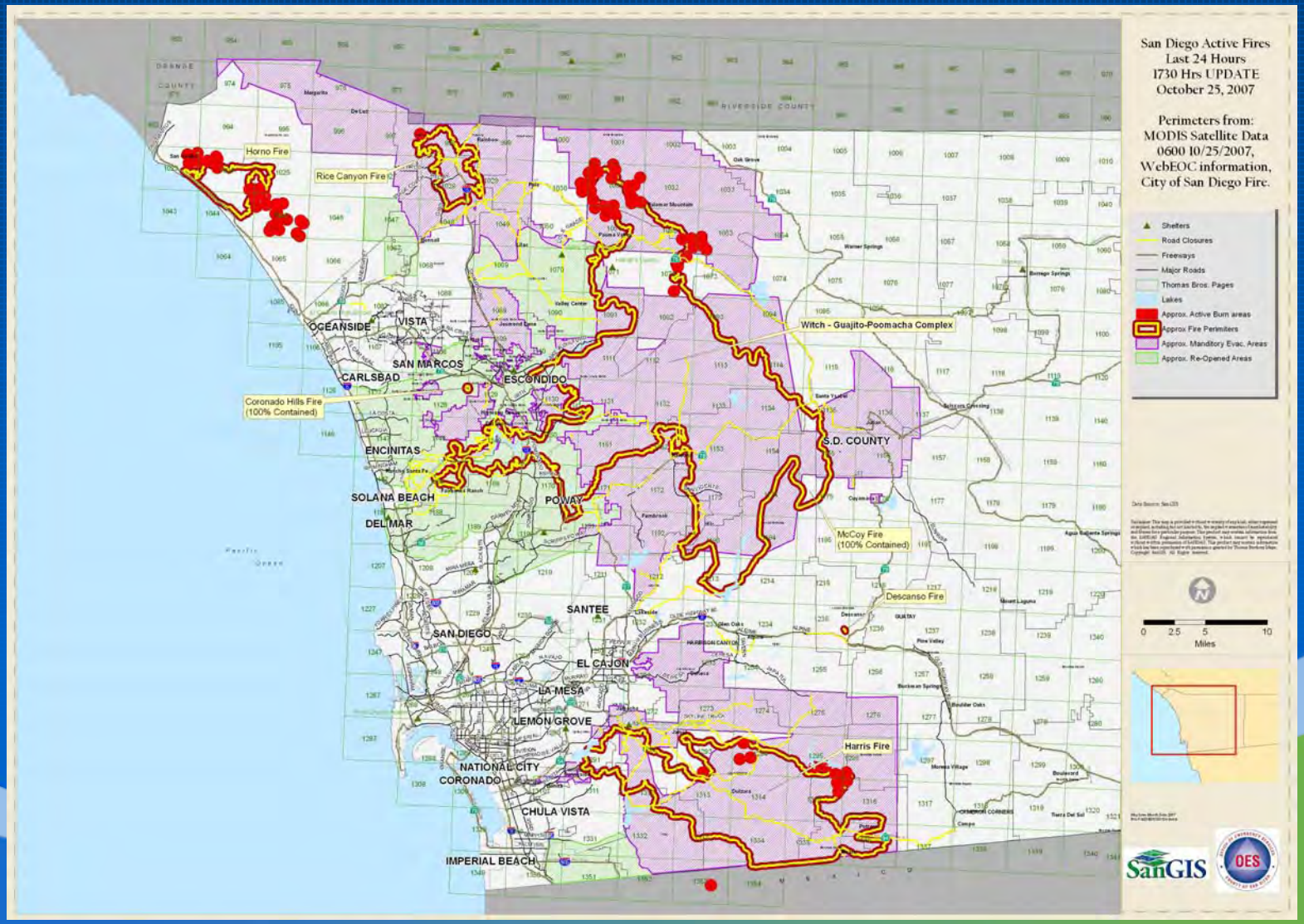

San Diego Active Fires
Last 24 Hours
1730 Hrs UPDATE
October 25, 2007
Perimeters from:
MODIS Satellite Data
0600 10/25/2007,
WebEOC information,
City of San Diego Fire.
Shelters
Road Closures
Freeways
Major Roads
Thomas Bros. Pages
Lakes
Approx. Active Burn areas
Approx Fire Perimiters
Approx. Manditory Evac. Areas
Approx. Re-Opened Areas
0 2.5 5 10
Miles
Horno Fire
Rice Canyon Fire
Witch - Guajito-Poomacha Complex
Coronado Hills Fire
(100% Contained)
McCoy Fire
(100% Contained)
Descanso Fire
Harris Fire
OCEANSIDE
VISTA
SAN MARCOS
CARLSBAD
ESCONDIDO
S.D. COUNTY
ENCINITAS
SOLANA BEACH
POWAY
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
NATIONAL CITY
CORONADO
CHULA VISTA
IMPERIAL BEACH
SanGIS
OES

# 2003 Fires

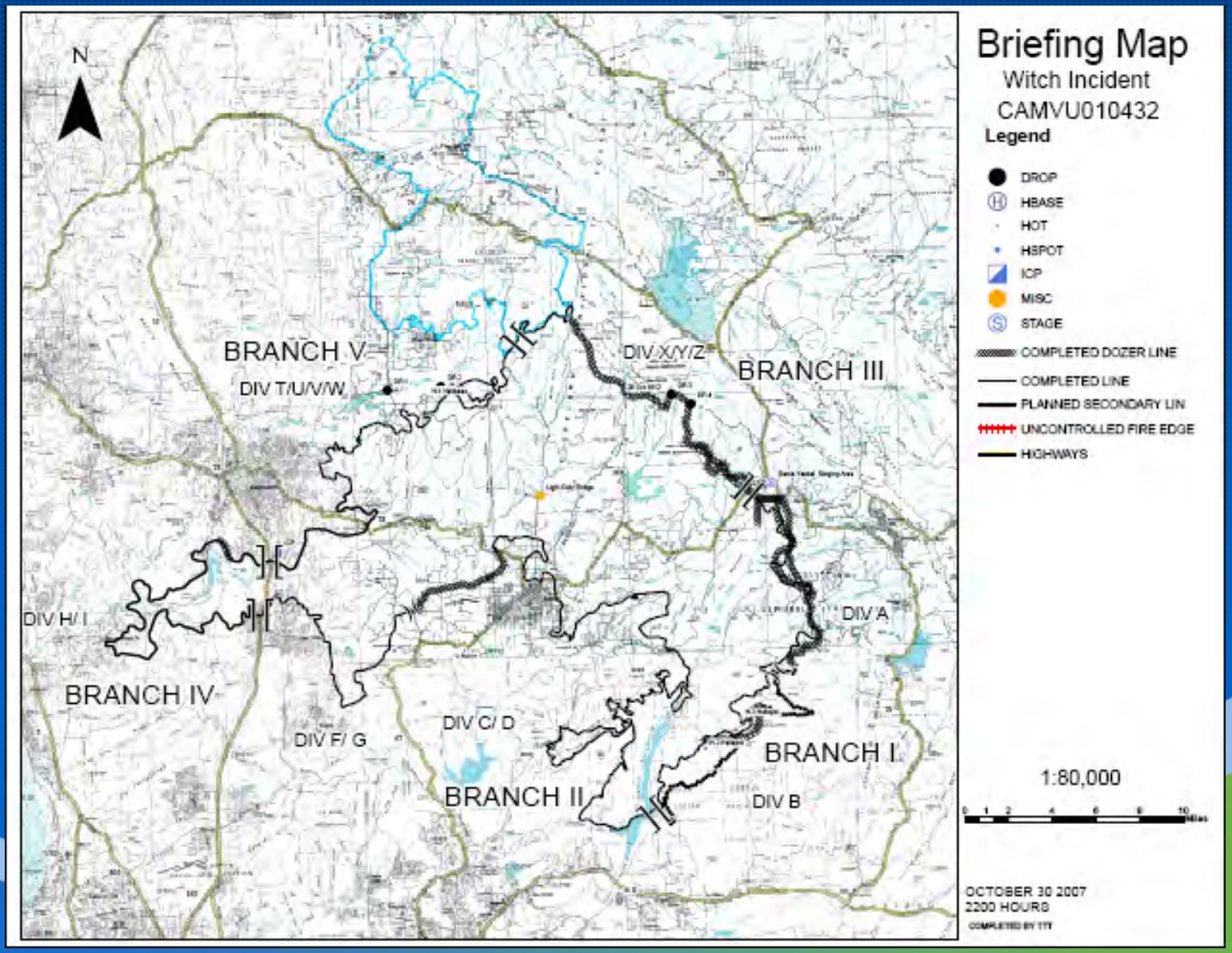
FIRESTORM
Oceanside
Valley Center
PARADISE FIRE
Carlsbad
Escondido
Ramona
5
15
Poway
CEDAR FIRE
Santee
Alpine
8
El Cajon
La Mesa
Barrett Jct.
Potero
OTAY FIRE
Chula Vista
MEXICO


SANTA BARBARA CO.
KERN CO.
Barstow
25 miles
LOS ANGELES CO.
VENTURA CO.
SAN BERNARDINO CO.
Santa Barbara
Ventura
Pacific Ocean
Malibu
Los Angeles
Riverside
Palm Springs
RIVERSIDE CO.
ORANGE CO.
Multiple blazes
At least 12 fires were active in Southern California as of Monday evening.
Large fire
Smaller fire
Contained fire
San Diego
SAN DIEGO CO.
MEXICO
Sources: Cal Fire, InciWeb
Map data: ESRI, TeleAtlas, USGS
Nathaniel Levine/nlevine@sacbee.com

# 2007 Fires

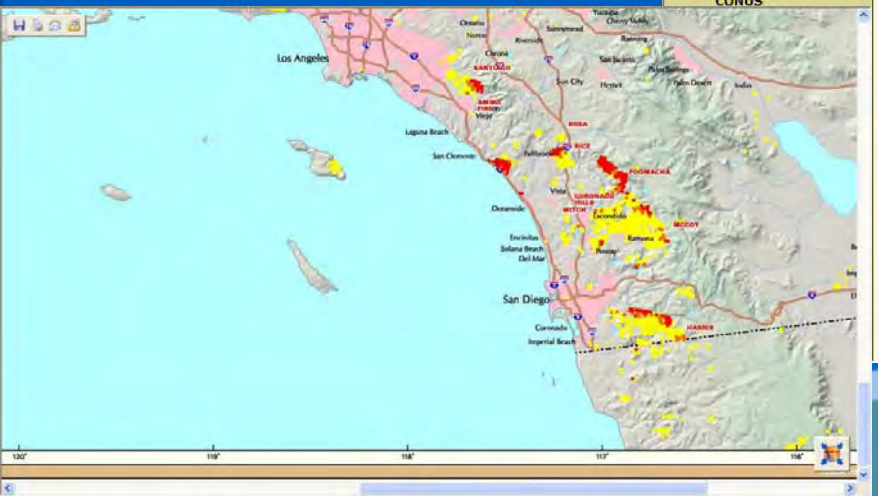

San Diego Active Fires
Last 24 Hours
1730 Hrs UPDATE
October 25, 2007
Perimeters from:
MODIS Satellite Data
0600 10/25/2007,
WebEOC information,
City of San Diego Fire.
Shelters
Road Closures
Freeways
Major Roads
Thomas Bros. Pages
Lakes
Approx. Active Burn areas
Approx Fire Perimiters
Approx. Manditory Evac. Areas
Approx. Re-Opened Areas
0 2.5 5 10
Miles
Horno Fire
Rice Canyon Fire
Witch - Guajito-Poomacha Complex
Coronado Hills Fire
(100% Contained)
McCoy Fire
(100% Contained)
Descanso Fire
Harris Fire
OCEANSIDE
VISTA
SAN MARCOS
CARLSBAD
ESCONDIDO
S.D. COUNTY
ENCINITAS
SOLANA BEACH
POWAY
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
NATIONAL CITY
CORONADO
CHULA VISTA
IMPERIAL BEACH
SanGIS
OES

# CalFire


N
BRANCH V
DIV T/U/V/W
DIV X/Y/Z
BRANCH III
DIV H/ I
DIV A
BRANCH IV
DIV F/ G
DIV C/ D
BRANCH I
BRANCH II
DIV B
Briefing Map
Witch Incident
CAMVU010432
Legend
DROP
HBASE
HOT
HSPOT
ICP
MISC
STAGE
COMPLETED DOZER LINE
COMPLETED LINE
PLANNED SECONDARY LIN
UNCONTROLLED FIRE EDGE
HIGHWAYS
1:60,000
OCTOBER 30 2007
2200 HOURS

# MODIS Data

- Moderate Resolution Imaging Spectroradiometer
- Terra & Aqua
- 36 Spectral Bands
- 1KM Resolution



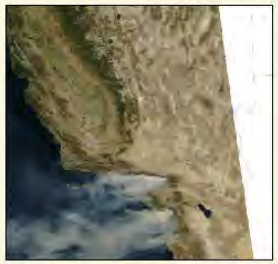

USDA FOREST SERVICE REMOTE SENSING APPLICATIONS CENTER

MODIS Active Fire Mapping Program

Search go

- RSAC Home
- About Us
- Contact Us
- Programs and Services
- BAER
- Active Fire Maps
  - Current Large Fires
    - United States
    - Canada
  - Regional Maps
    - United States
    - Canada
  - ArcIMS Maps
    - CONUS

250-meter Georeferenced MODIS Surface Reflectance Subsets



Download this subset as 3-band JPEG or GeoTIFF, or as a 7-band BSQ (band sequential) image. Click here for a description of the MODIS spectral bands used for land remote sensing and subset projection information.

| JPEG | JPEG | BSQ | |
|---|---|---|---|
| Bands 1, 4, 3 (True Color) 773.94 KB | Bands 7, 2, 1 (False Color) 820.68 KB | Bands 1 - 7 (BSQ) 24.45 MB | True and False Color (GeoTIFF) 14.3 MB |

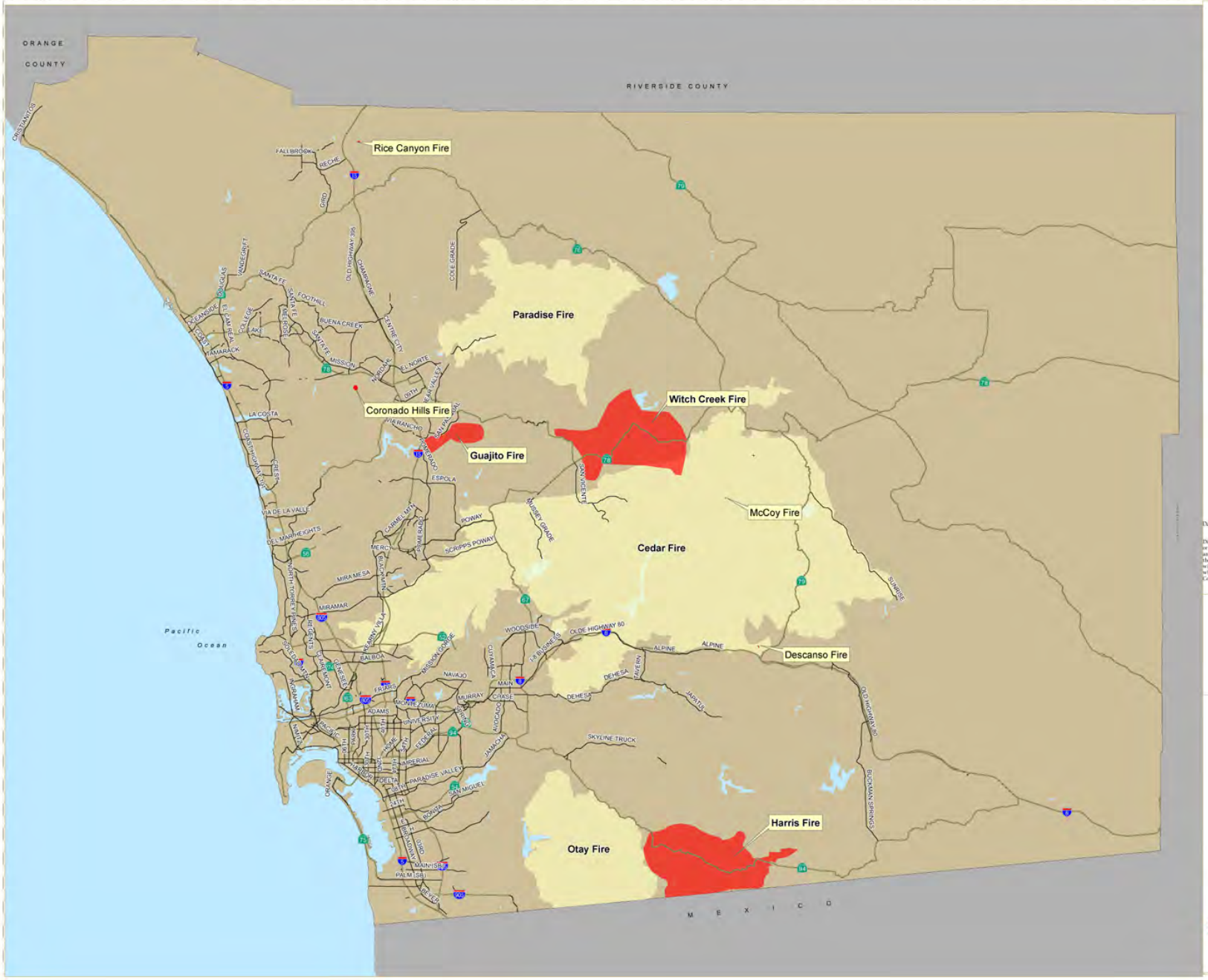
California_south
10/23/2007
21:38:18 GMT
Satellite: Aqua

Subset Acquisition Calendar

October 2007

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| 30 | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | 1 | 2 | 3 |

These fire information products were compiled at the USDA Forest Service (USFS) Remote Sensing Applications Center in cooperation with NASA Goddard Space Flight Center, the University of Maryland, the National Interagency Fire Center, and the USFS Missoula Fire Sciences Lab.




# San Diego Fires
01:00 October 22, 2007

- Major Roads
- Freeways
- Current Fire Perimeters
- 2003 Fire Perimeters
- Lakes

Data Source: SanGIS

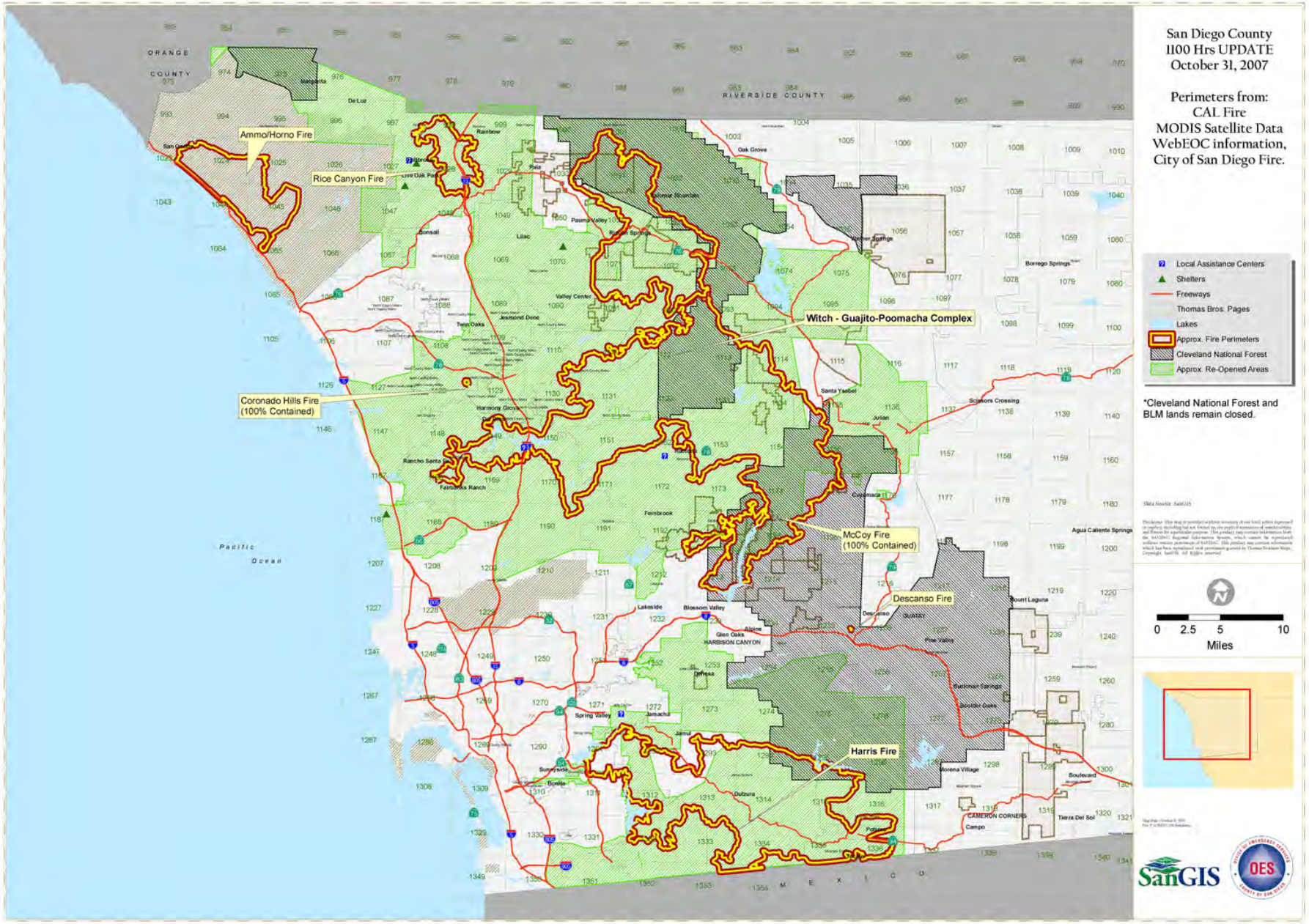
Disclaimer: This map is provided without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. This product may contain information from the SANDAG Regional Information System, which cannot be reproduced without written permission of SANDAG. This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps. Copyright SanGIS. All Rights reserved.

N

0 0.5 1 2 3 4 Miles

SanGIS

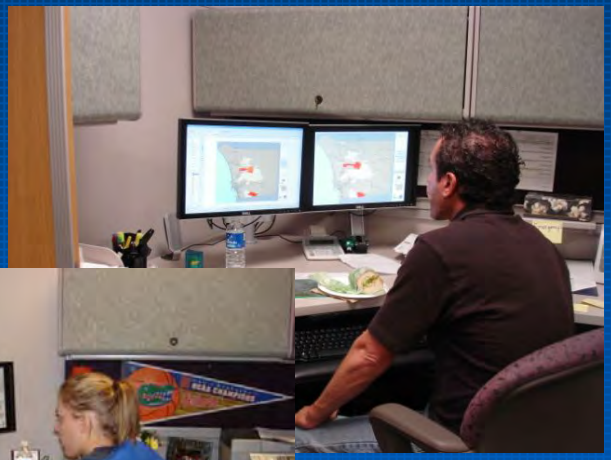
OES


San Diego County
1100 Hrs UPDATE
October 31, 2007
Perimeters from:
CAL Fire
MODIS Satellite Data
WebEOC information,
City of San Diego Fire.
Ammo/Horno Fire
Rice Canyon Fire
Witch - Guajito-Poomacha Complex
Coronado Hills Fire
(100% Contained)
McCoy Fire
(100% Contained)
Descanso Fire
Harris Fire
ORANGE COUNTY
RIVERSIDE COUNTY
Pacific Ocean
M E X I C O
Local Assistance Centers
Shelters
Freeways
Thomas Bros. Pages
Lakes
Approx. Fire Perimeters
Cleveland National Forest
Approx. Re-Opened Areas
*Cleveland National Forest and BLM lands remain closed.
0 2.5 5 10
Miles
SanGIS
OES

# Staffing

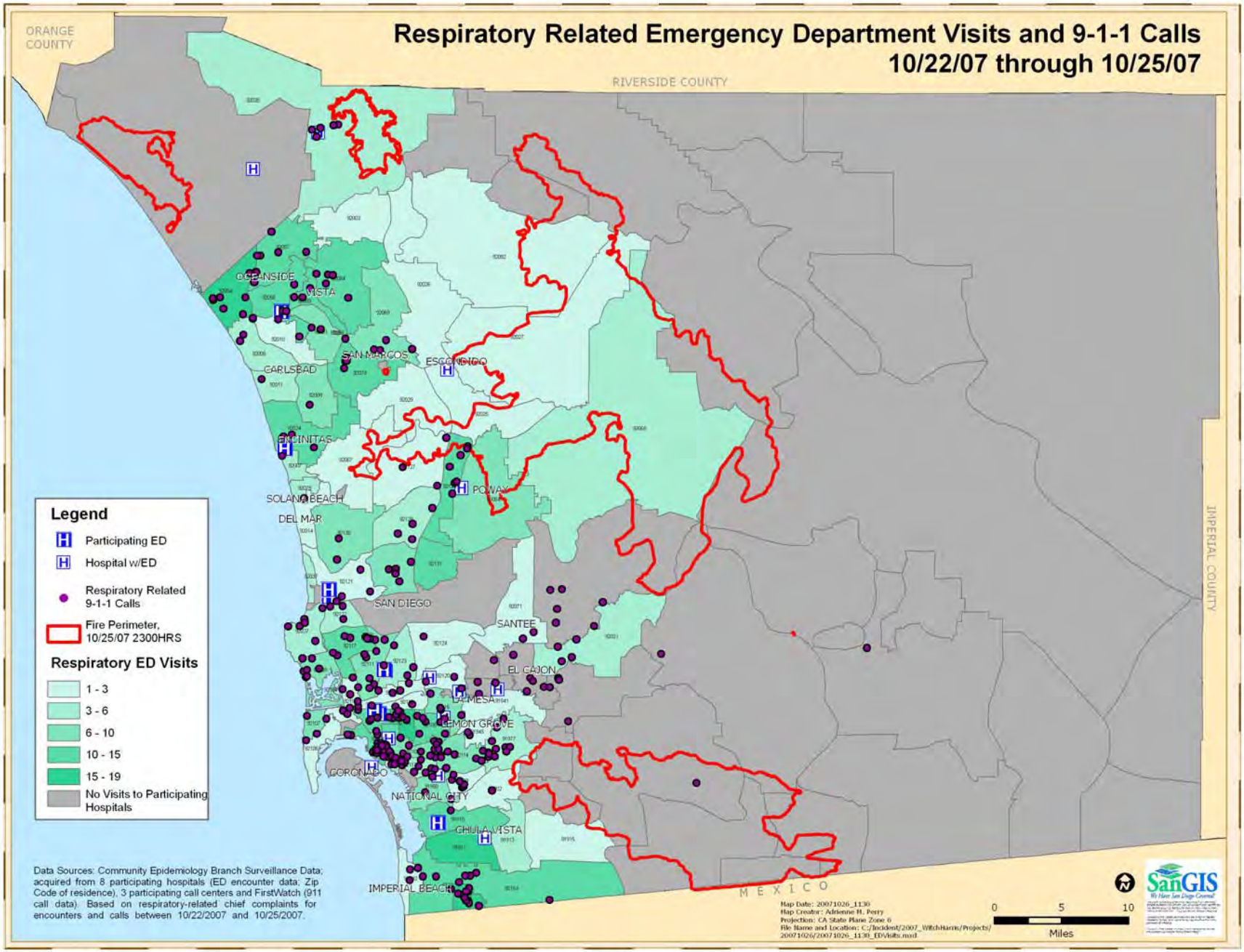
- GIS Unit Leader
- GIS Logistics/Policy
- 2-3 Analyst/Technician
- GIS Communications Specialist
- Off-Site Analyst
- Field Analyst/Observer

12 hour shifts



Comm. & Eng. Branch
CWA

SCRIBE


Respiratory Related Emergency Department Visits and 9-1-1 Calls
10/22/07 through 10/25/07
ORANGE COUNTY
RIVERSIDE COUNTY
IMPERIAL COUNTY
MEXICO
OCEANSIDE
VISTA
SAN MARCOS
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
SAN DIEGO
SANTEE
EL CAJON
LA MESA
LEMON GROVE
CORONADO
NATIONAL CITY
CHULA VISTA
IMPERIAL BEACH
Legend
Participating ED
Hospital w/ED
Respiratory Related 9-1-1 Calls
Fire Perimeter, 10/25/07 2300HRS
Respiratory ED Visits
1 - 3
3 - 6
6 - 10
10 - 15
15 - 19
No Visits to Participating Hospitals
Data Sources: Community Epidemiology Branch Surveillance Data; acquired from 8 participating hospitals (ED encounter data; Zip Code of residence), 3 participating call centers and FirstWatch (911 call data). Based on respiratory-related chief complaints for encounters and calls between 10/22/2007 and 10/25/2007.
Map Date: 20071026_1130
Map Creator: Adrienne M. Perry
Projection: CA State Plane Zone 6
File Name and Location: C:/Incident/2007_WitchHarris/Projects/20071026/20071026_1130_EDVisits.mxd
0 5 10
Miles
SanGIS

ORANGE COUNTY
RIVERSIDE COUNTY
IMPERIAL COUNTY
MEXICO
D.S. 214
612
D.S. 3
9
D.S. 43
114
D.S. 36
115
D.S. 296
900
D.S. 47
135
D.S. 93
282
D.S. 110
302
D.S. 16
49
D.S. 7
23
1
2
3
4
OCEANSIDE
VISTA
SAN MARCOS
ESCONDIDO
CARLSBAD
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
SAN DIEGO
SANTEE
EL CAJON
CORONADO
NATIONAL CITY
CHULA VISTA
IMPERIAL BEACH
LOCAL ASSISTANCE CENTERS
1. FALLBROOK
Fallbrook Community Center
341 Heald Lane
Fallbrook, CA 92028
2. RANCHO BERNARDO
Rancho Bernardo -
Glassman Recreation Center
18448 West Bernardo Drive
San Diego, CA 92127
3. RAMONA
Ramona Community Center
1710 Montecito Road
Ramona, CA 92065
4. RANCHO SAN DIEGO
Cuyamaca College
900 Rancho San Diego Pkwy.
El Cajon, CA 92019
Data Source: Damage Assessment provided by DPLU as of 10/25/07. Zip Codes top label - D.S. = Damaged/Destroyed Structure, bottom label = estimated affected population based on SANDAG 2006 Persons Per Household estimates.
Map Date: 20071025_1500
Map Creator: Adrienne M. Perry
Projection: CA State Plane Zone 6
File Name and Location: C:/Incident/2007_WitchHarris/Projects/20071025/20071025_1500_LAC.mxd
0 5 10
Miles
SanGIS

Caltrans District 11
San Diego
Rice Canyon Fire
Horno Fire
Witch Creek Fire
Harris Ranch Fire
Legend
State Route Status
Tier I - OK To Open
Tier II - Open - Reduced Speed
Tier III - Closed
For DOT Routes - Subject to County OES Full Approval
Damage Assessments - Field Review Data
Sign Damage
MDGR
Road Damage and Spalling
ROW Fence
Crash Cushion, Solar Panel, Call Box, Electrical
CMP Culvert
ROW Fence - Burned Segments
Missing Guardrail Segments
ESTIMATED FIRE PERIMETERS 10/26/2007 1415 HRS
MANDATORY EVAC AREAS 10/27/2007 0830 HRS
REOPENED AREAS 10/27/2007 0830 HRS
Map Produced October 27, 2007
N
0 1.5 3 6 9 12
Miles

# Population

## POPULATION AND HOUSING ESTIMATES (2007)

*2007 Wildfire Evacuation Areas*

SANDAG

The following population and housing unit data are based on parcel-level housing counts from the San Diego County Assessor's Office, the U.S. Census Bureau, and SANDAG's Regional Information System.

### POPULATION (January 1, 2007)

| | Persons |
|---|---|
| **Total Population** | **515,077** |
| Household Population | 507,976 |
| Group Quarters Population | 7,101 |

### HOUSING (January 1, 2007)

| | Units |
|---|---|
| **Housing Units** | **187,785** |
| Single Family - Detached | 127,101 |
| Single Family - Multi-Unit | 14,340 |
| Multiple Family | 39,672 |
| Mobile Home and Other | 6,672 |

It is not possible to reliably estimate detailed demographic characteristics for this area. The following information provides the characteristics of a larger geographic area that includes the study area. While not a precise representation of the study area, it does provide an indication of its general demographic and economic characteristics.

### HOUSING TENURE (January 1, 2007)

| | Occupied Units | Vacancy Rate | Persons per Household |
|---|---|---|---|
| **Occupied Housing Units** | **177,776** | **5.3%** | **2.86** |
| Single Family - Detached | 68% | – | – |
| Single Family - Multi-Unit | 8% | – | – |
| Multiple Family | 20% | – | – |
| Mobile Home and Other | 4% | – | – |

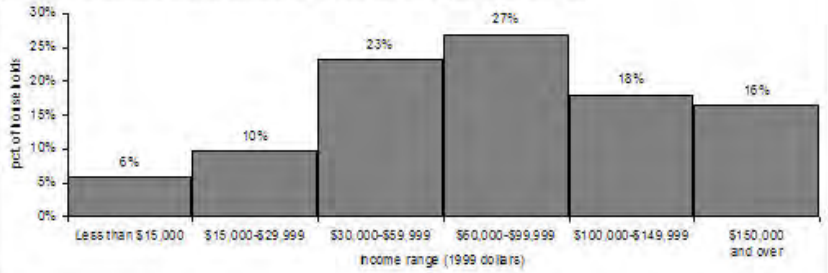
### GENDER AND AGE (January 1, 2007)

| | Male | Female |
|---|---|---|
| 0 to 17 | 12% | 12% |
| 18 to 34 | 11% | 9% |
| 35 to 64 | 21% | 22% |
| 65 and older | 6% | 7% |
| Total Population | 50% | 50% |

### RACE AND ETHNICITY (January 1, 2007)

| | Percent |
|---|---|
| Hispanic | 18% |
| Non-Hispanic | 82% |
| White | 67% |
| Black | 3% |
| American Indian | 1% |
| Asian & Pacific Islander | 9% |
| Other | 3% |

### HOUSEHOLD INCOME DISTRIBUTION (real 1999 dollars, adjusted for inflation)

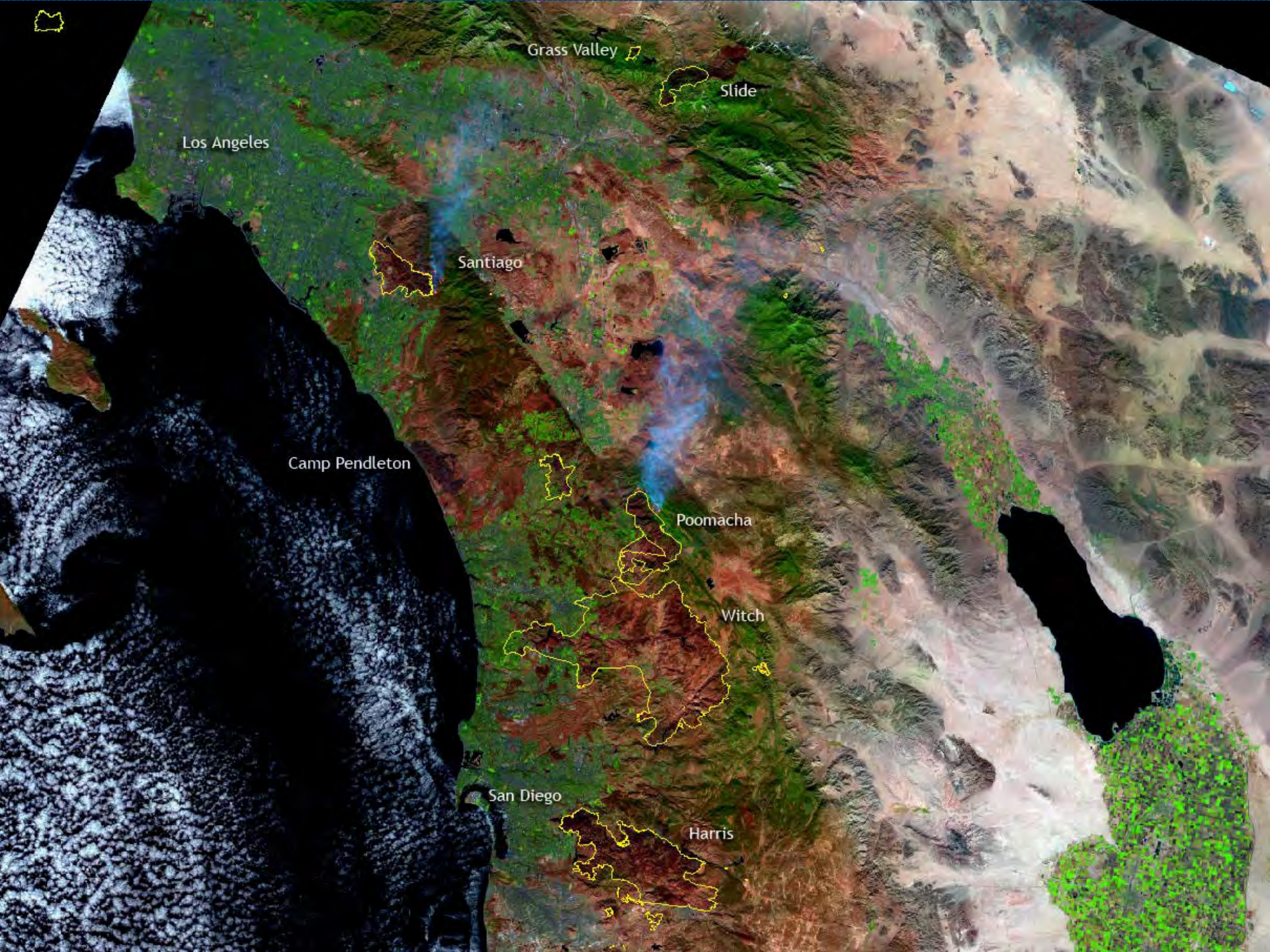



**Median Household Income**

| | |
|---|---|
| Adjusted for inflation (1999 $) | $74,498 |
| Not adjusted for inflation (current $) | $96,339 |

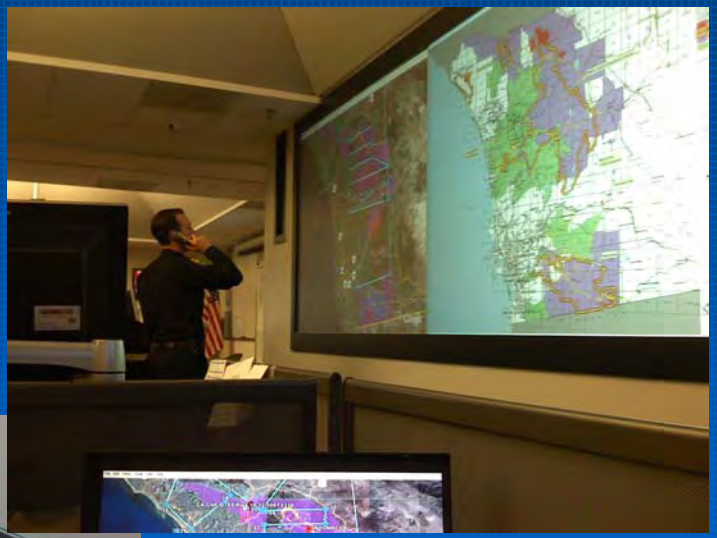
Source: SANDAG Current Estimates (2007)

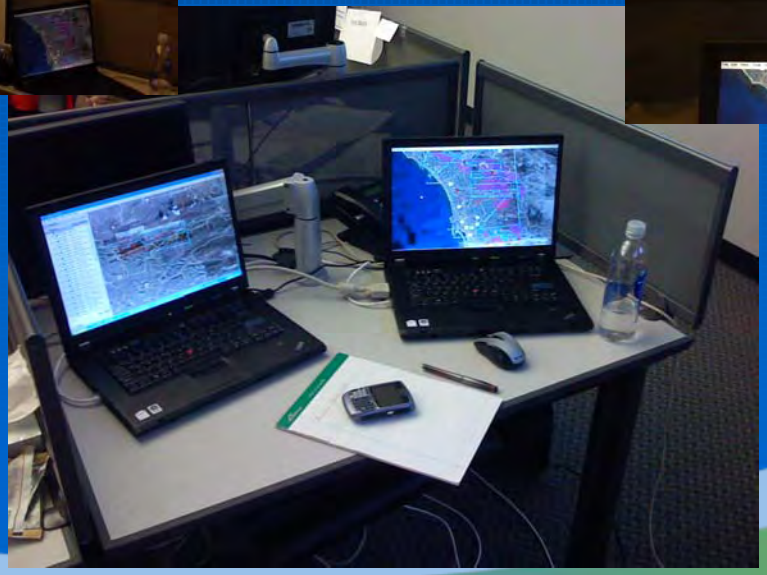
October 2007

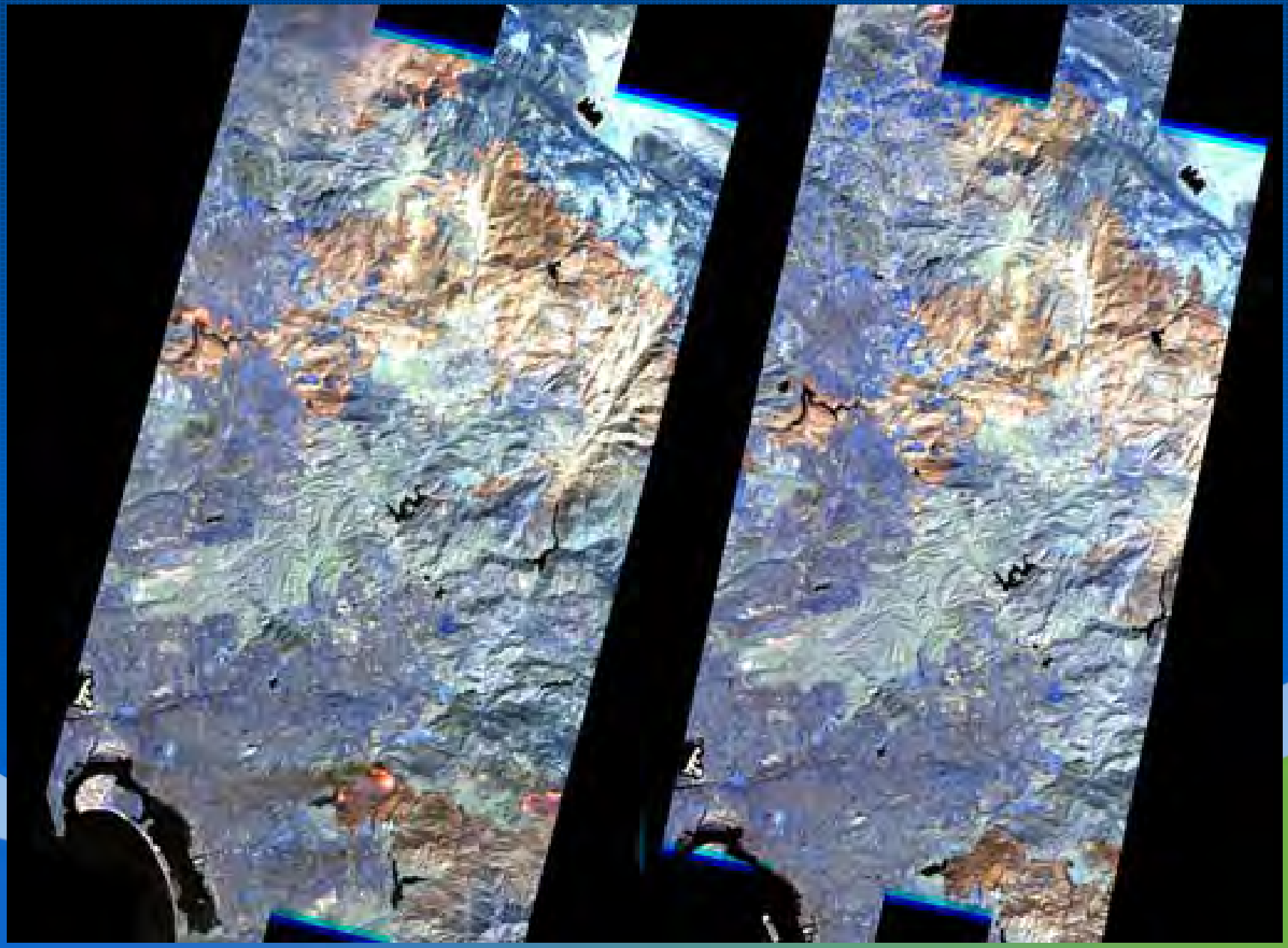

Grass Valley
Slide
Los Angeles
Santiago
Camp Pendleton
Poomacha
Witch
San Diego
Harris

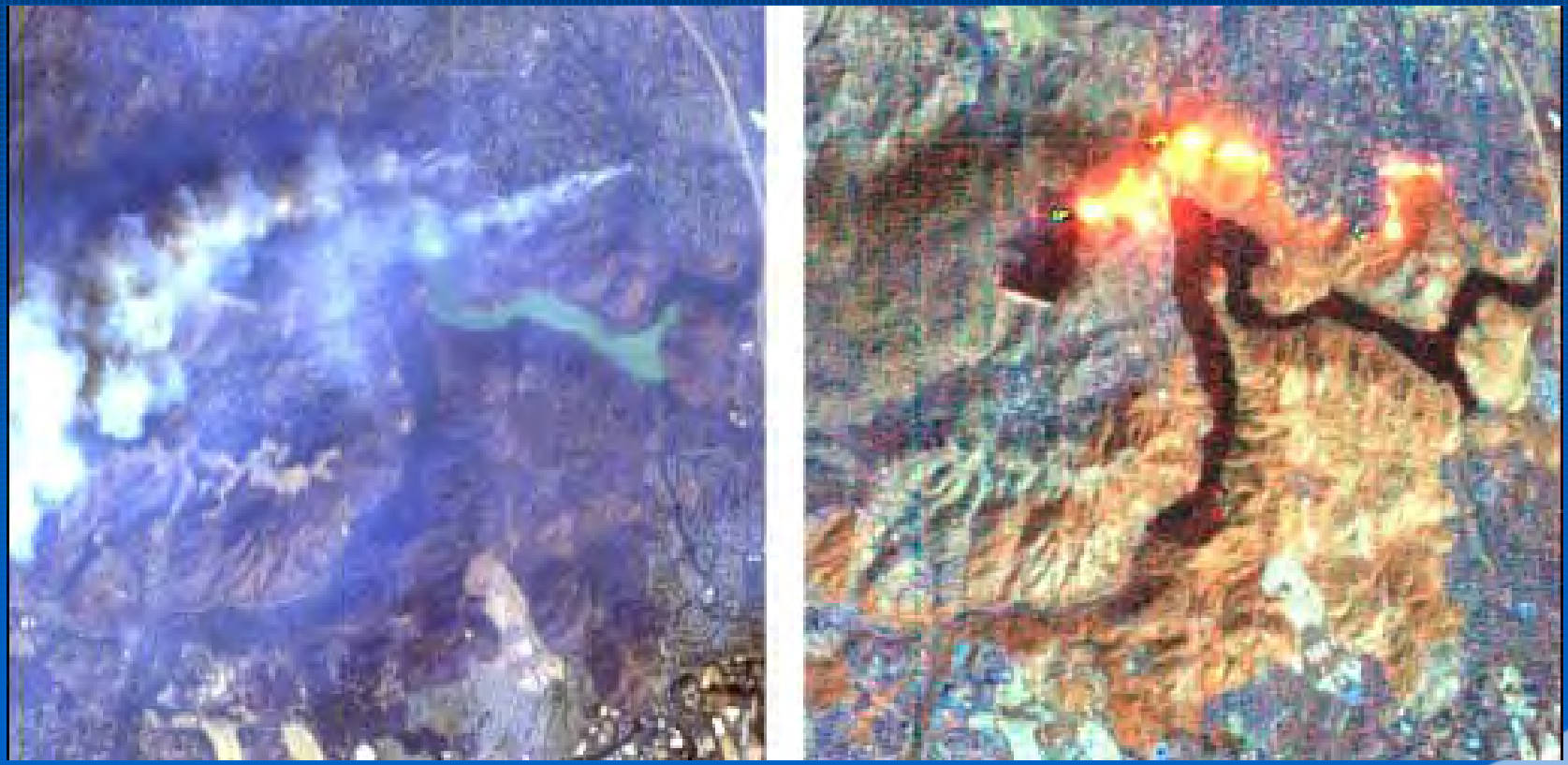
San Diego Active Fires
Predator Imagery
20071028_1130hrs
Local Assistance Centers
Shelters
Freeways
Major Roads
Thomas Bros. Pages
Lakes
Approx. Fire Perimeters
Approx. Active Burn areas
0 0.250.5 1
Miles
SanGIS
OES

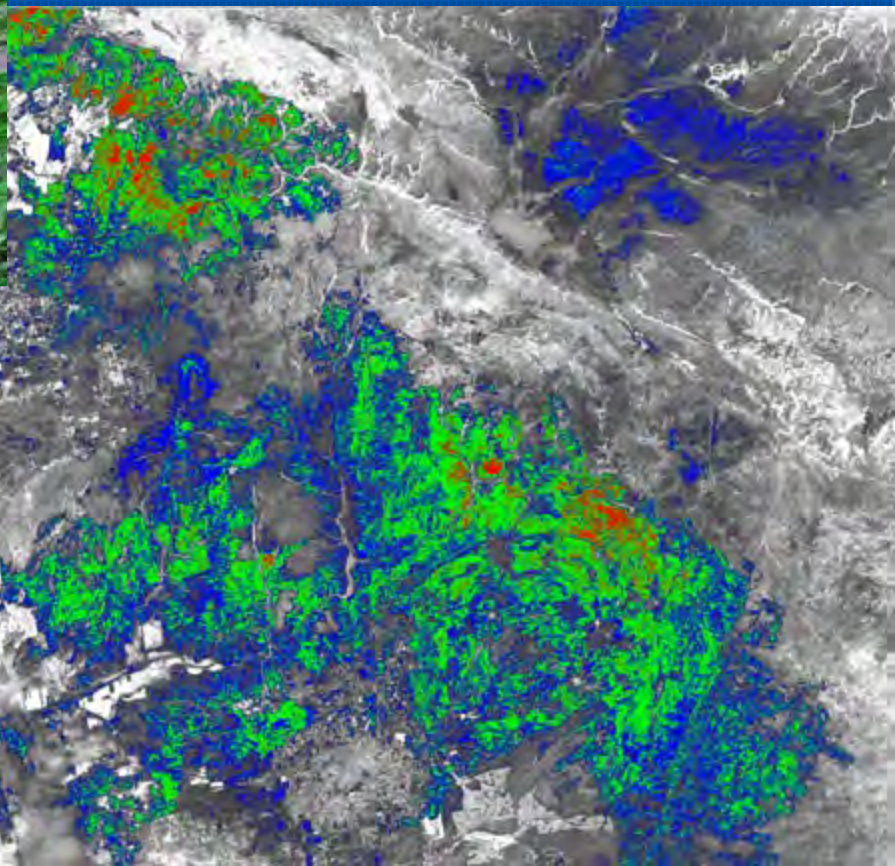
(Select)
Record #: 1313
Posted: 10/26/2007
10:48:52
Original: 10/26/2007
10:38:14
Information Only
Record #: 1312
Posted: 10/26/2007
10:37:35
Original: 10/26/2007
09:00:31
Information Only
Record #: 1310









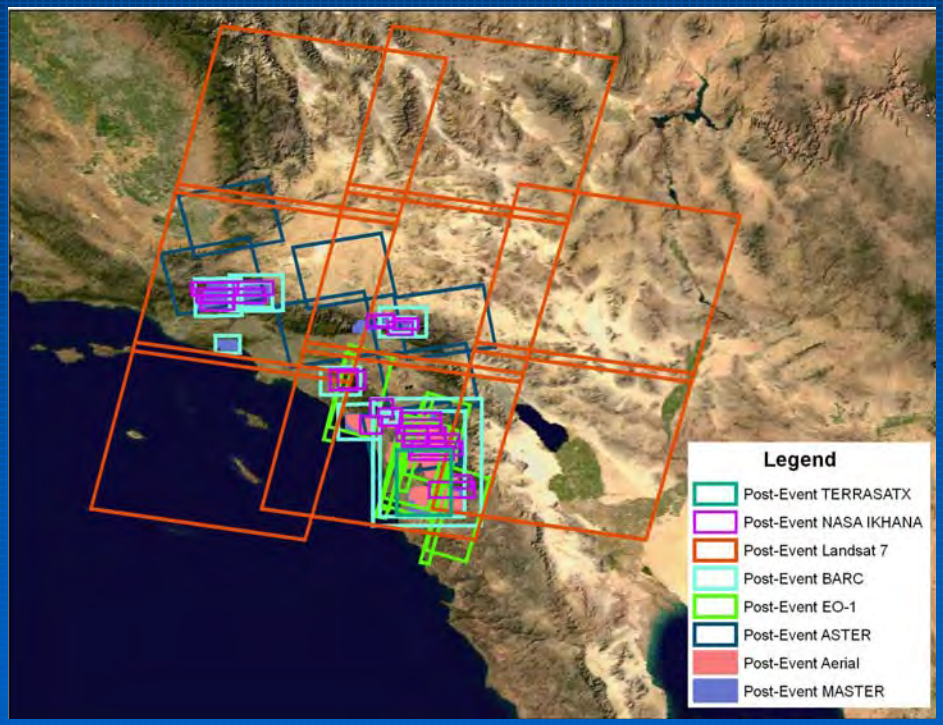


# Pre-Event/Baseline Data Loaded

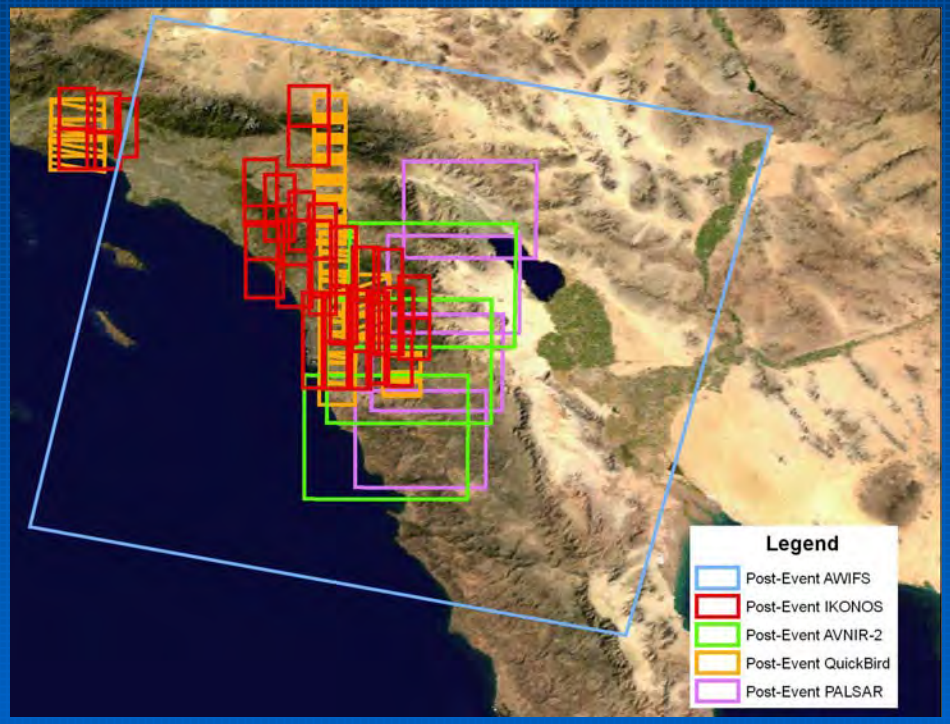
Public Access Data
- Landsat 5
- USDA NAIP
- High-Resolution Urban Area Aerial Data

Restricted Access Data
- Ikonos and QuickBird from NGA/WARP
- ALOS AVNIR and PALSAR (JAXA via IC)
- ResourceSAT AWIFS (ISRO Via IC)

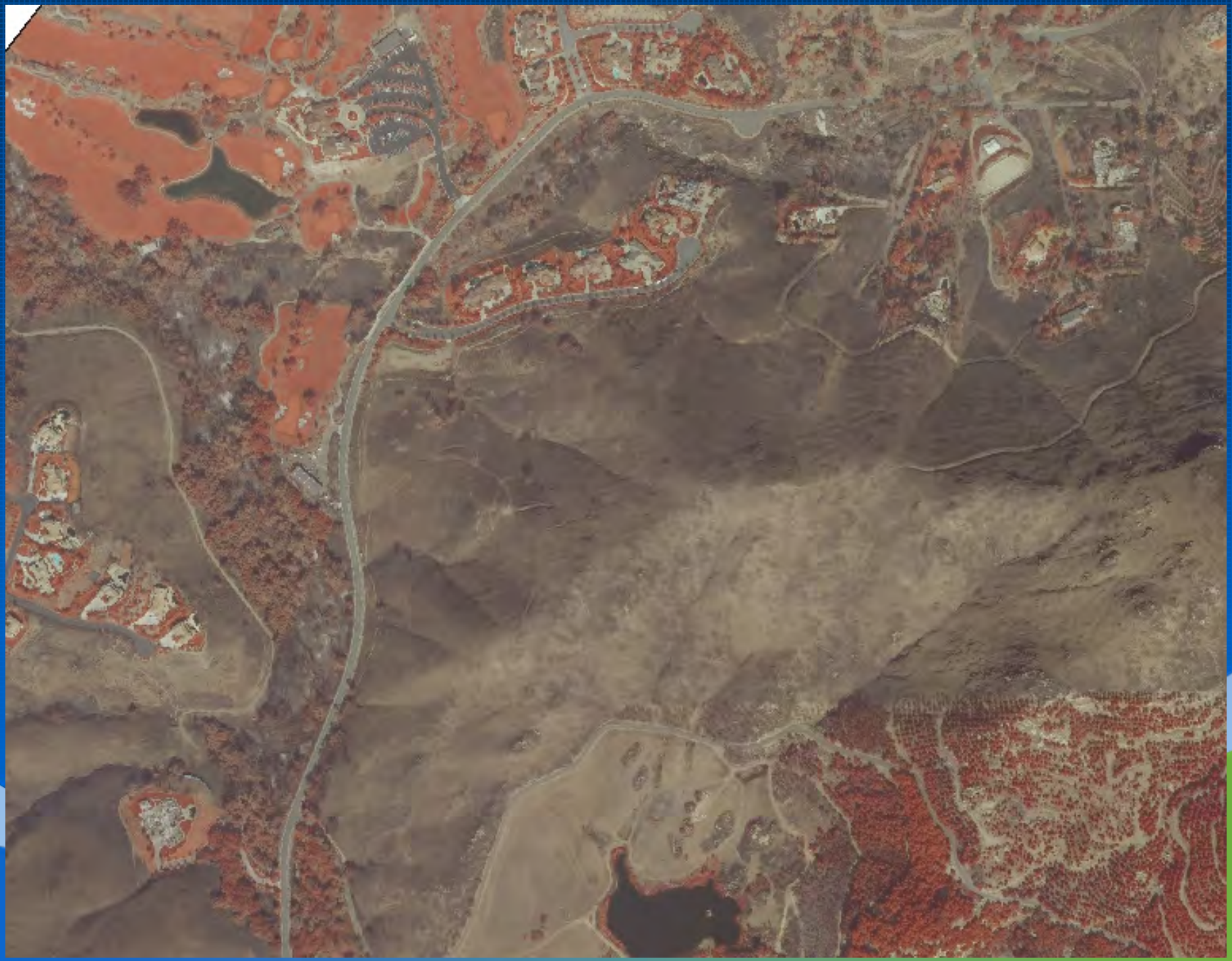
# Post-Event Data Loaded




Public Access Data




Restricted Access Data



# Remote Sensing and GIS Operations

FEMA/JFO
(RS/GIS Lead)

- Operational Priorities
- Requests for Information (RFIs)
- Adhoc Support
- Air Coordination

State Agencies
- CalFire
- Resources

Incident Teams

- Information Requests

Southern California
Geographic Area Coordination Center (GACC)

***CAL FIRE Sit Stat Cell***

- Information Requests

State Operations Center

- *Assignment of Direct Support*
- *Capability Assessment*
- *Situational Awareness*

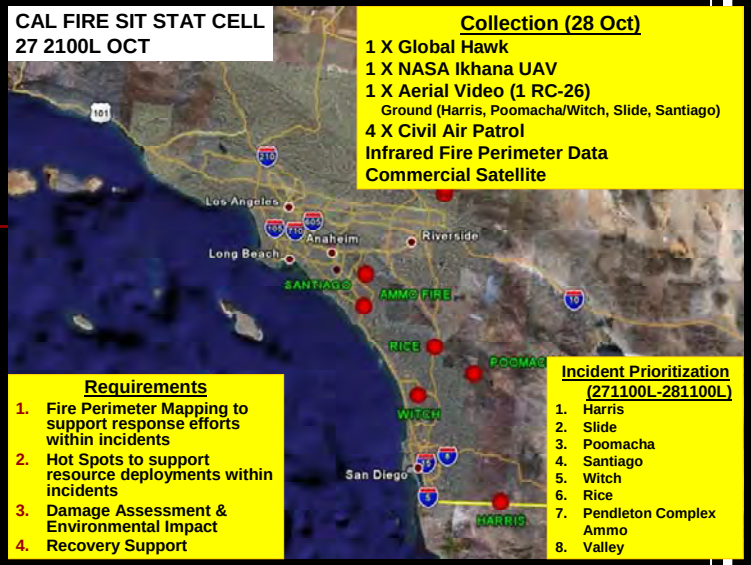
- *Request for Federal Assistance*
- *Request for Guard Support*

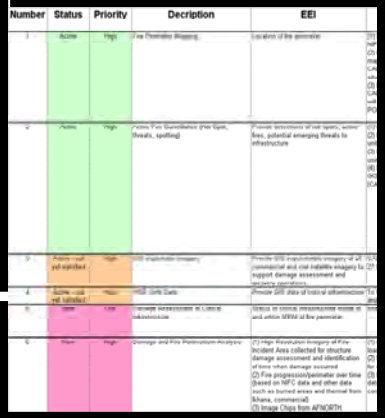
***Co-located GIS***
- ***CALFIRE***
- ***OES***
- ***Resources***

Enterprise Server

# Tasks

- Prioritize and coordinate Remote Sensing and GIS support
  - Prioritize requirements based on incident operations, intelligence and fire weather
  - Consolidate information needs across geographic area
  - Translate information needs into requirements




## RFI-5 Additional Deta

1. Issues:
   - Request 1 look digital imagery co infrastructure within and near fire close out.
   - Low priority requirement for collec from incident to incident
   - Request employment of CAP ass previously collected U-2/GH data
2. Status:
   - *Initial target deck attached. Reques assessment efforts by NGA/DHS/F prioritize for submission to CAP as*

## Aerial Imaging S

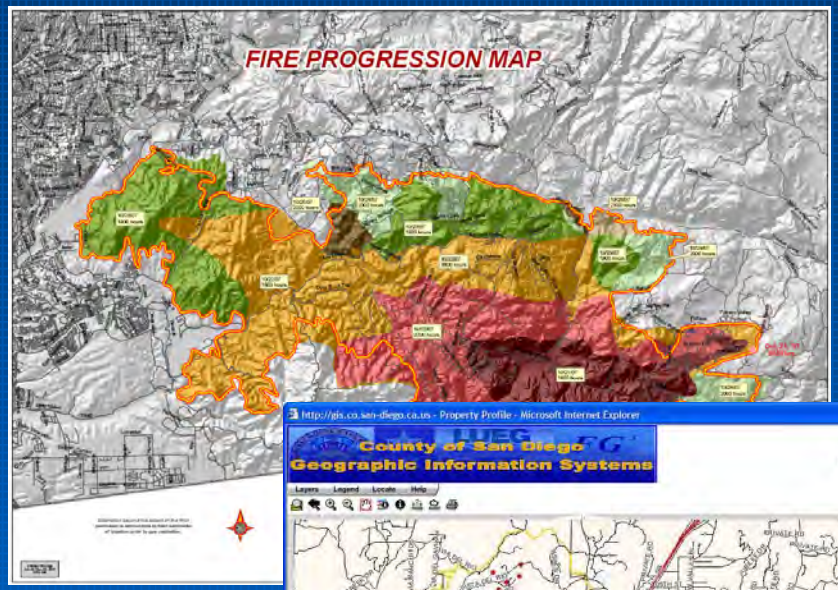
1. FMV:
   - Retain RC-26 support throug
   - Release P-3 and request rec asset.
   - C-130 ScatheView from Nati
   - OH-58 support on hold pend
2. GH/U-2:
   - Anticipate GH requirement thr incidents. Expect release of ai
   - Request FEMA determine/eva assets (commercial, etc) for D
3. Civil Air Patrol:
   - *Request employment of CAP aircraft (and Archer sensor) as Air Force Auxiliary support for Critical Infrastructure and Damage Assessment.*

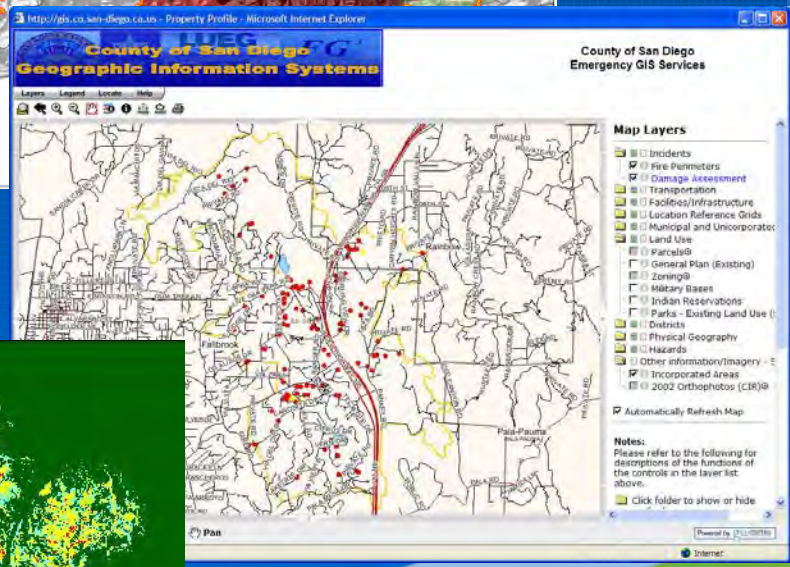
## Prioritized Information Requirements

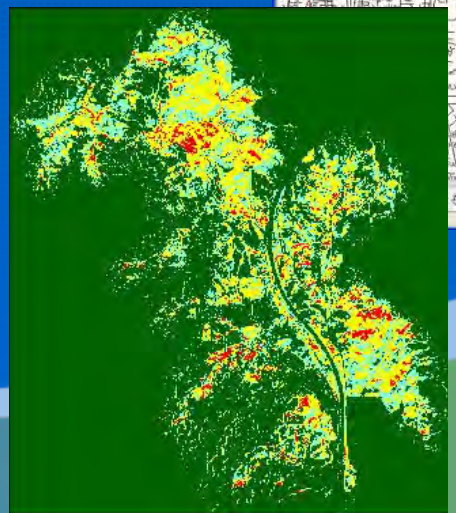
1. Fire Perimeter Mapping to support incident response efforts
2. Hot Spots Detection to support resource deployments within incidents
3. Detection of imminent threats to infrastructure, personnel, or property
4. Damage Assessment and Recovery Assistance

# Post Fire Data

- Fire Progression Maps
- Public Land Ownership
- Damage Assessment
  - Structures
  - Agriculture
  - Habitat
- Burned Area Emergency Recovery
  - Soil Erosion
  - Increased Runoff
  - Flooding
- Fuels and Fire Risk



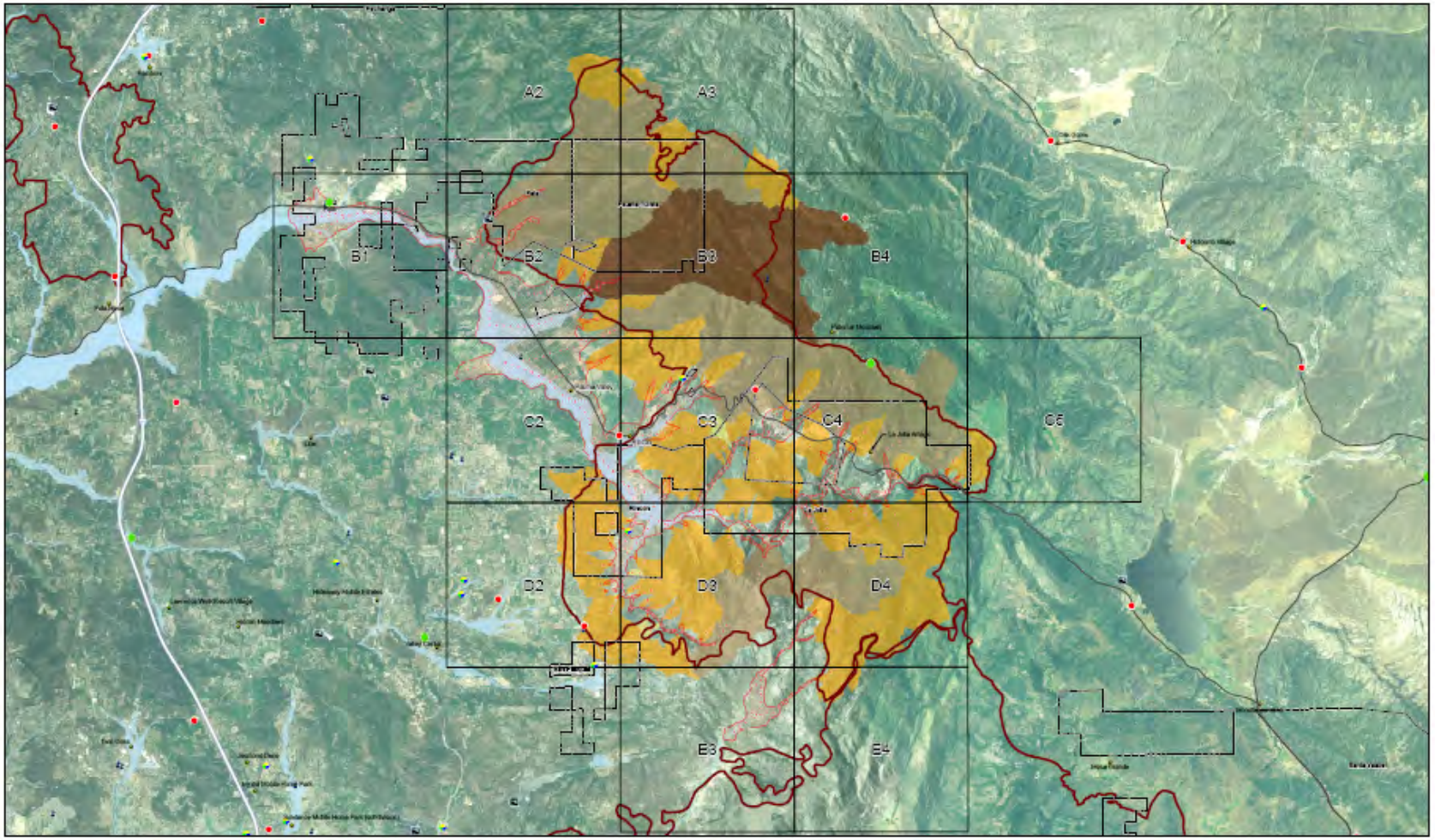
Total Pop.
12,471

# Poomacha Post-Fire Hazard Awareness Map

FEMA DR-1731-CA

DO NOT DISTRIBUTE - FIUO

Page #
Index




FEMA

USGS

US Army Corps of Engineers

OES

CAL FIRE

MAP DISCLAIMER

LEGEND

- PopulatedPlaces
- Daycare Facilities
- EMS
- Schools
- Fire Station
- Dam
- Poomacha Debris Flow Lines
- Tribal Lands
- FEMA Flood Hazard Areas
- Fire Perimeters
- FEMA Potential Debris Flow Areas

USGS Potential Debris Volume

- 0 to 1,000 cubic meters
- 1,001 to 10,000 cubic meters
- 10,001 to 100,000 cubic meters
- >100,000 cubic meters

LOCATION MAP

INDEX MAP

Department of Homeland Security
Federal Emergency Management Agency
Date Created: 11/29/07
Author: MASG - Colton
Version: V 1.0

0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 4 5 Miles

MAPS FOR ADVISORY PURPOSES ONLY. NOT FOR INSURANCE RATING PURPOSES.

# 2007 Successes

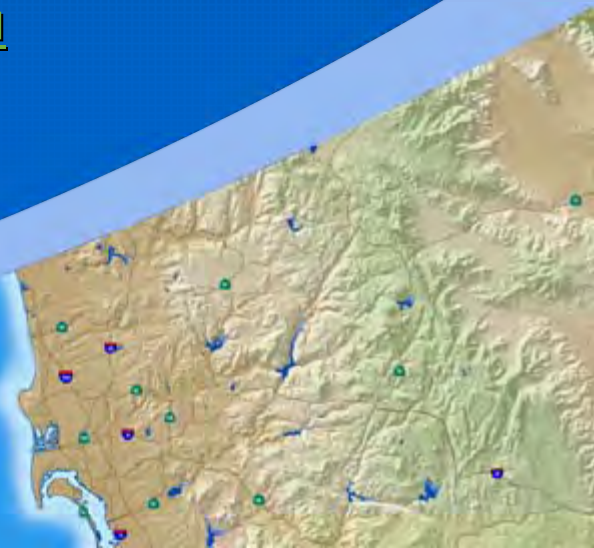
- Quick release of maps and imagery to the press and public
- Mapping of evacuation areas
- Use of the Thomas Brothers map overlays enhanced the ability to interpret and locate the information portrayed
- Draft GIS SOP implemented and tested during the fires
- Outstanding cooperation between EOC GIS staff, State, and Federal agencies facilitated the use of technologies normally reserved for the military or intelligence communities
- Availability of off-site GIS analysts to conduct geospatial analysis away from the flurry of activity within the EOC
- Damage assessment teams ability to collect information on GPS and transfer directly into County GIS
- Pre-mapping of special needs facilities allowed for the evacuation of 2100 medically fragile individuals

# 2007 Lessons Learned

- GIS staff from jurisdictions, agencies, and utilities that had not been trained in WebEOC and were not aware of information sharing protocols
- Some jurisdictions performed GIS mapping on stand alone computer systems without access to the internet, which resulted in delayed dissemination of data between agencies
- Continue to track incident information if it moves beyond the boundaries of San Diego County
- Standardize terminology among response organizations for geographic locations
- Reverse 911 data is currently not in a GIS compatible format, results in longer mapping times of evacuation areas
- Damage assessment was conducted independently by each jurisdiction; It is unclear if they were using the same criteria for the assessment and the resulting geospatial data sets could not be integrated due to attributes and spatial geometry differences.

# *Thank You*

Paul Hardwick
phardwick@foundation.sdsu.edu
619-594-8992



# Diplomatic Expert Elicitation for Intelligence, Strategy and Scientific Technology Threat


## Terry O'Sullivan, PhD

**Center for Risk and Economic Analysis of Terrorism Events (CREATE)**
**University of Southern California**


## Science as Diplomacy Panel

**Department of Homeland Security**
**Science and Technology Stakeholders Conference**
**Los Angeles Convention Center**
**January 14, 2007**

# Increasing *Terrorist* Capabilities

**Expanding Terrorism Lethality:**

- ***Rapid technology improvements***
- ***Access to weaponry***
- ***Innovative tactics***

Bio-/Nano-terror

*- Future -*

Casualty Producing Ca

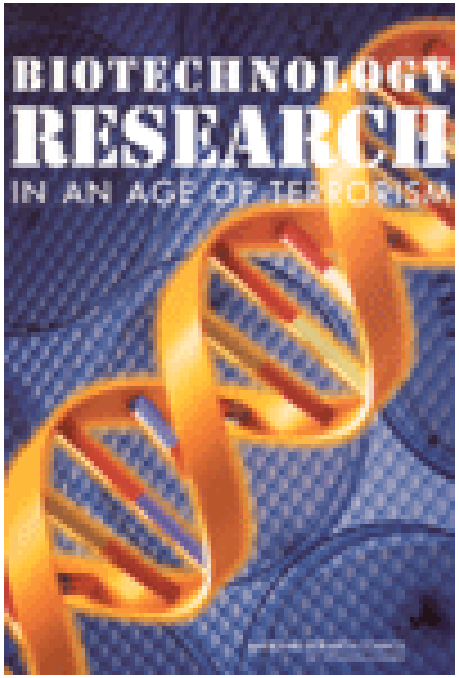
One → Dozens → Thousands → Millions

Slide adapted from Admiral William Sullivan, DoD

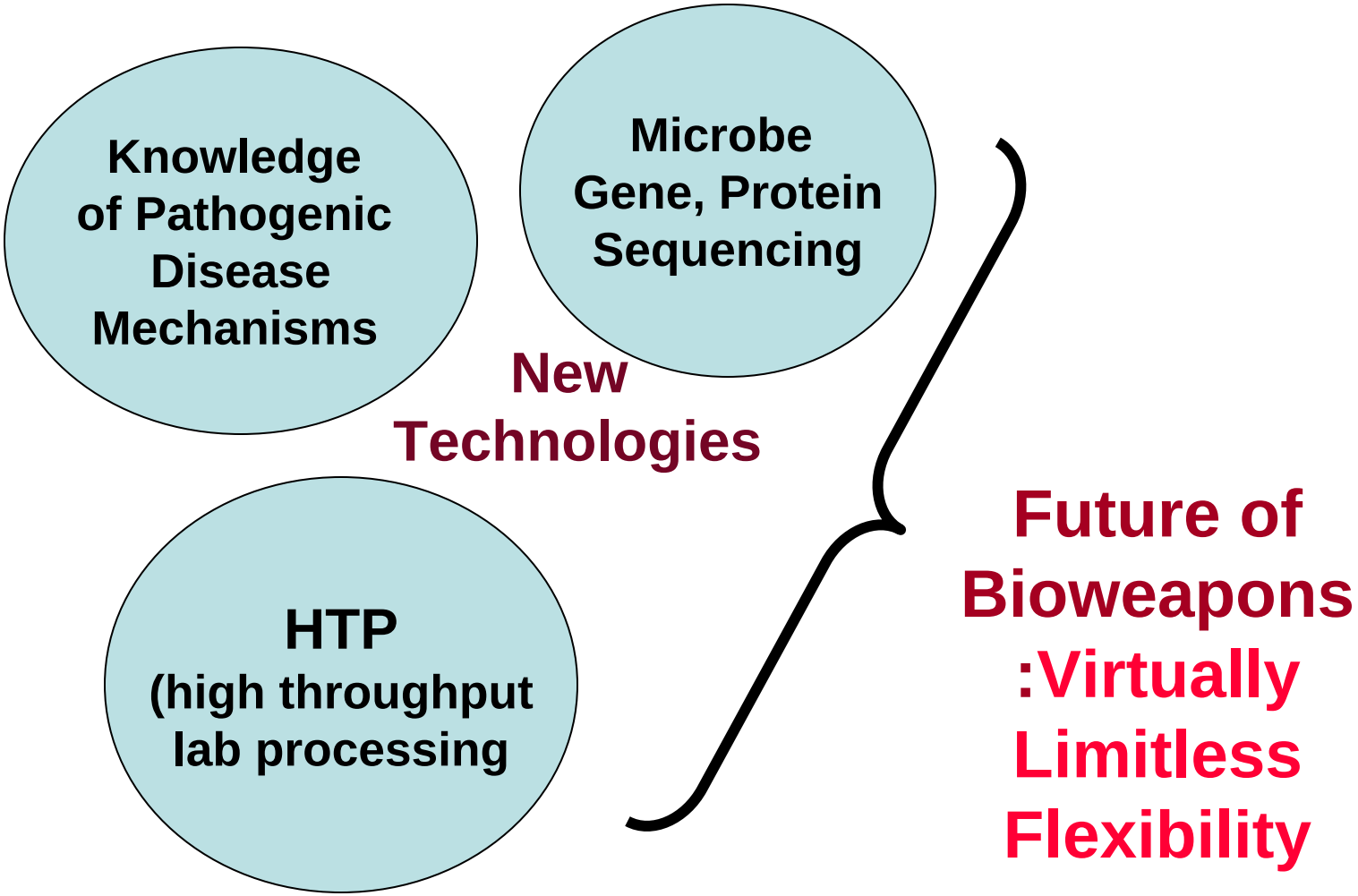
# Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil

## Genetic engineering breakthroughs

- **Genetic sequencing data** on specific microbes -- soon will all be known
- **Rapid gene sequencing** (can exploit vulnerabilities
- **Proteomics** (protein genomics -- essential functioning of cells)
- **Nano-Technology** - Numerous converging technologies, often unrelated until breakthrough
- U.S. National Academies of Science (NAS): ***Biotechnology Research in An Age of Terrorism*** **(2004)**



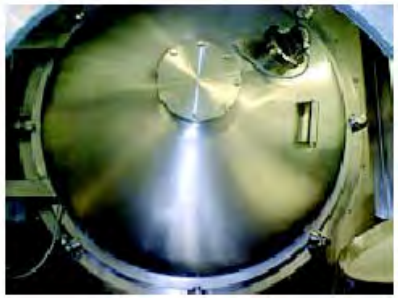
# Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil




Adapted from S. Johnston (2006): IOM

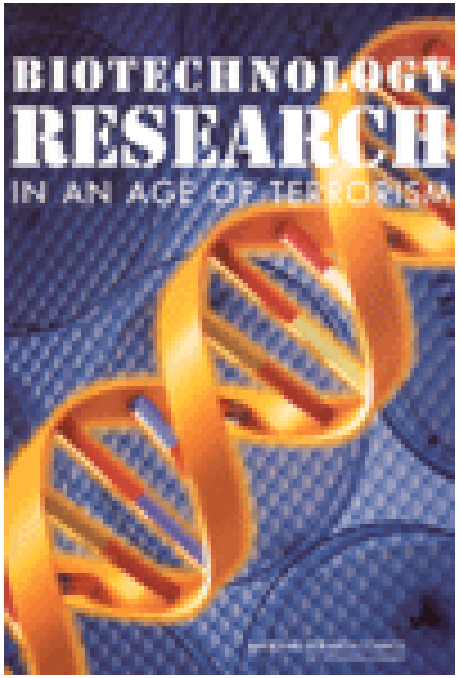
# Globalization-related Vulnerabilities for Public Health, Infectious Diseases

- **Biological Technology Diffusion**
  - Very steep Technology Curve
  - Biomedical revolution double-edged sword
  - Most biological technology is “dual use” (useful for *both* medicine & weaponry)



# Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil

- **Equipment virtually the same (dual use)**
  - **for civilian and bioweapons production**
  - **Very difficult to police, detect programs**
- **"Chimera" pathogens** (combined bugs, or newly constructed ones)
- **Enhanced "superbugs"** (drug-, vaccine resistance by manipulating IL-4)
- **Pathogens reassembled from DNA fragments** in labs (already occurred)
- **Skill threshold dropping** ("lone gunman")



# Biotechnology: New Research Safeguards

**Guidelines Recommended to Prevent Releasing Technology that might:**

- Boost the threat posed by a biological agent or toxin, such as by augmenting its virulence, stability or transmissibility
- Impair a host's immunity or the effectiveness of an immunization
- Enhance a pathogen's resistance to vaccines or other countermeasures, or its ability to avoid detection
- Heighten the stability, transmissibility or ability to disperse a biological agent or toxin
- Increase the number of species or populations that could be infected by a disease
- Enhance the host population's susceptibility to a biological agent
- Develop a new pathogen or toxin or recreate an extinct agent.

*NSABB Draft Guidance Documents*
February 2007

NATIONAL SCIENCE ADVISORY BOARD FOR BIOSECURITY

# Biosecurity Risk: Realities, Issues

## Analytical Complications:

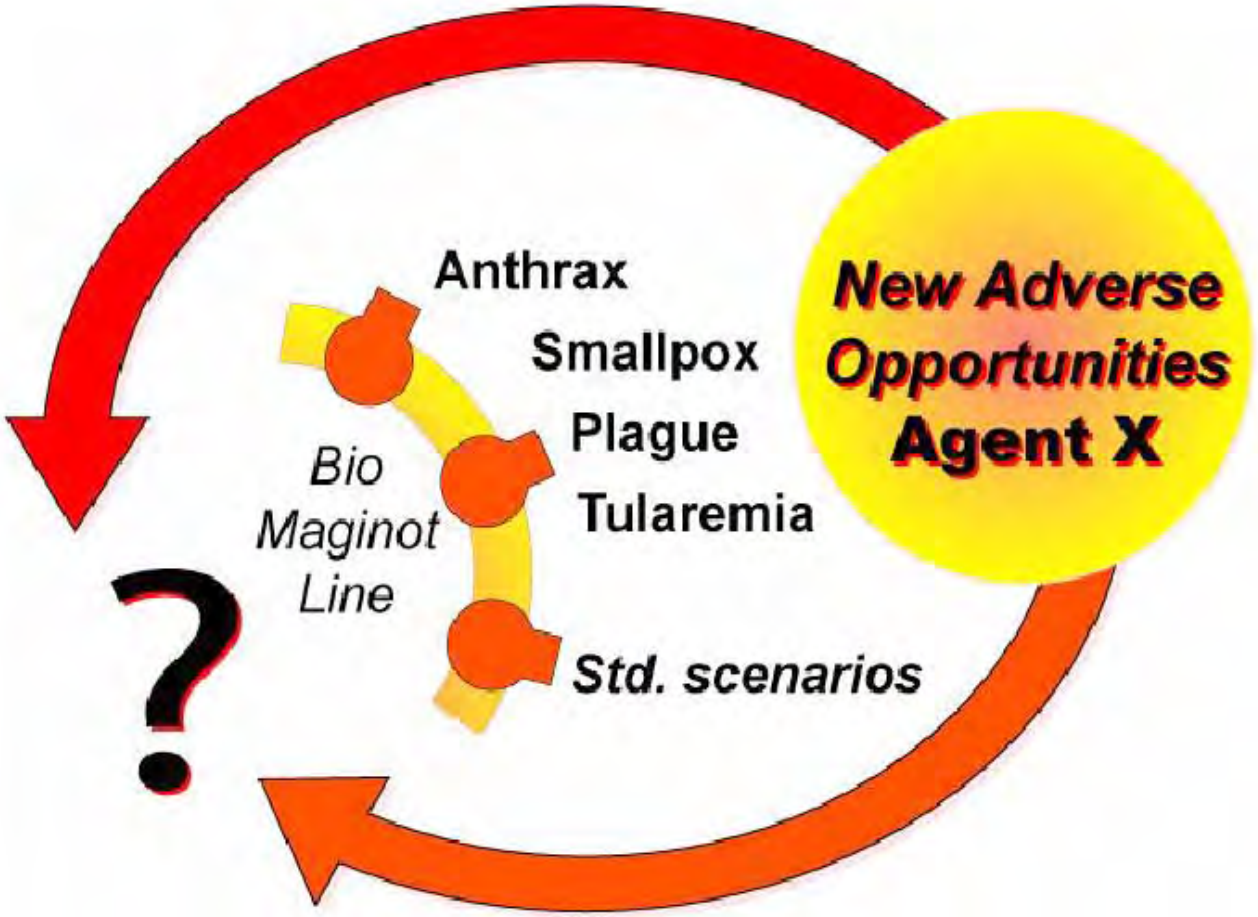
- ***Expert Elicitation*** **is more difficult (complexity)**
- ***Ranking of Agents*** **not as useful as might be thought**
- ***Scenario-creation*** **may even be problematic**
  - **Too many variables in outcome, science**
  - **May lend degree of overconfidence to planners**

# Biosecurity Risk Analysis: Realities, Issues

## Expert Elicitation

- **Limited by:**
  - **Doctors:**
    - **Lack of ID training in medical schools, lack of Bioterror, terrorism knowledge**
    - **Lack of experience** with even natural epidemics
    - **Little knowledge of agents, pathogens**
    - **OR how they would propagate in epidemic** -- due to ignorance AND lack of data, modern precedent
  - **Security experts:**
    - **Lack of medical knowledge at all**
    - **Even Nano-tech "experts" cannot know it all, given the disparate fields that are converging**
    - **"brainwashed" by "All-Hazards" approach -- apples and oranges**

# Avoiding a Biosecurity "Maginot Line" and "Agent X" Problem




Stephen Johnston - U.S. Institute of Med. presentation 12/6/07

# Overview:

- Technology change increasingly rapid
- Disparate technologies increasingly merging
- Expertise and investment shifting overseas, out of direct control
- Increasing overlap between civilian enterprises and military/weapons technologies and production methods
- Changes occurring in:
  - Nature of information gathering, and even problem framing
  - Ability of in-house Subject Matter Experts to anticipate future threats, or to be able to respond effectively
  - Will be more reliant on cooperation from overseas AND domestic SMEs
- Need to reshape modus operandi of intelligence gathering and international diplomacy
  - Transparency:  More, not less (to coincide with open scientific cultures)
  - Cooperation:  Can't afford to alienate expert communities, to preserve good will and government/agency reputations in long term
  - Two way communication: What's in it for them?
- Issues, Problems:
  - How to address diverse S&T SME cultures: Government vs. private sector enterprises
  - Globalization widens security "systems" to entire world -- multiple countries, enterprises, MNCs: Who do you negotiate with?

# The UK Science & Innovation Network – A Tool for Diplomacy

January 14th, 2007

Andy Perkins
Science & Innovation Officer
British Consulate General, Los Angeles
Email: Andy.Perkins@fco.gov.uk
Phone: (310) 996-3023

# A Message from the Foreign Secretary

Foreign policy is not just about projecting our own values outwards, using our influence as best we can to shape the world around us. Increasingly, and just as importantly, it is about identifying where we can gain from the expertise and knowledge of others . . .

Nowhere is that more important than in the field of scientific endeavour. The great technological advances of the past 20 years have brought immense benefits to the world. But they have also created new and acute challenges, many of which will only be solved through new scientific breakthroughs. The Science and Innovation Network provides the crucial two-way global linkage that we need.

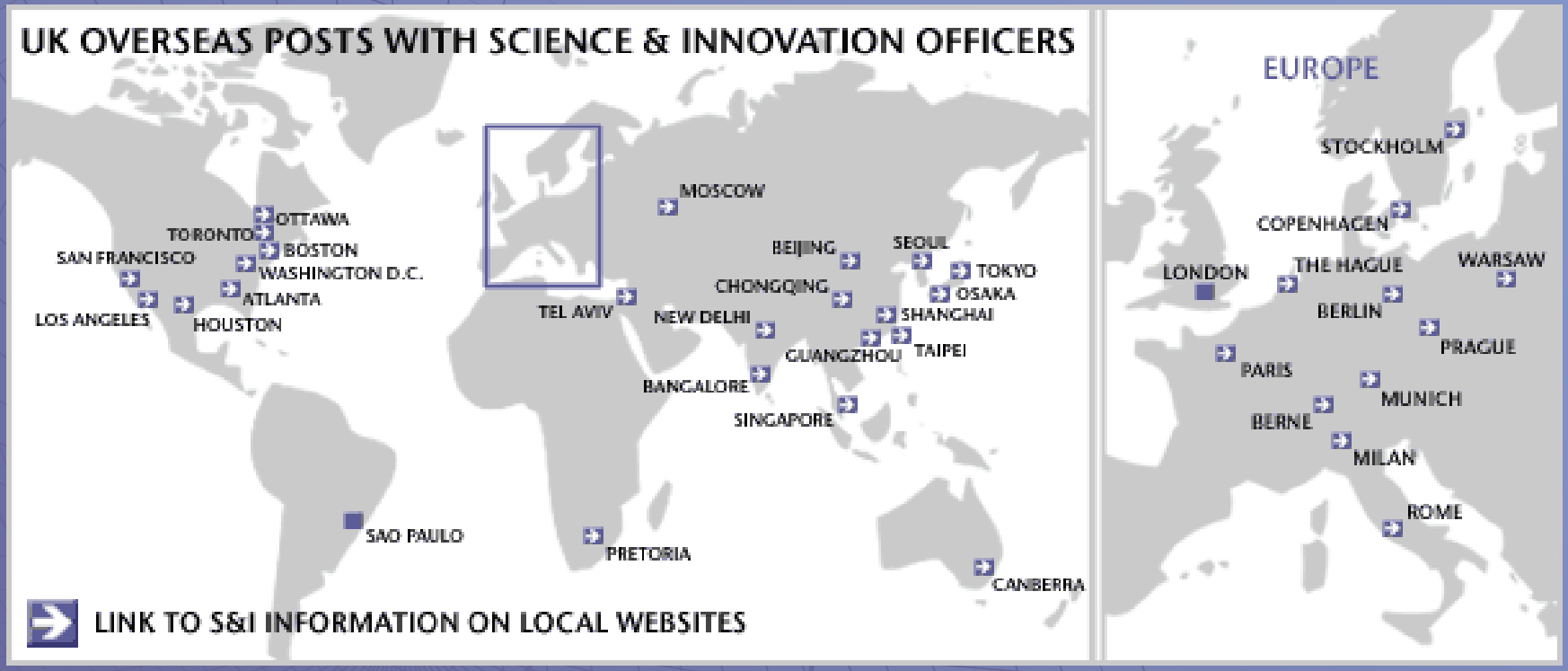
- David Miliband, Foreign Secretary

UK SCIENCE & INNOVATION

# History of the Science & Innovation Network

- Established in 2000 by the Foreign & Commonwealth Office (FCO)
- Funded through the FCO and stationed mostly in overseas posts
- First US science posts established in 2002
- Science Counsellors in Washington, Paris, Beijing, Tokyo, & Munich
- Largest representation in the US and Japan
- Recent expansion in China and India

# The Global Network




As of April 2007 – 96 Science Specialists in 39 Diplomatic Missions in 24 countries

UK SCIENCE & INNOVATION

# The FCO's International Priorities

- Making the world safer from global terrorism and weapons of mass destruction
- Reducing the harm to the UK from international crime, including drug trafficking, people smuggling and money laundering
- Preventing and resolving conflict through a strong international system
- Building an effective and globally competitive EU in a secure neighbourhood
- **Supporting the UK economy and business through an open and expanding global economy, science and innovation and secure energy supplies**
- **Achieving climate security by promoting a faster transition to a sustainable, low carbon global economy**
- Promoting sustainable development and poverty reduction underpinned by human rights, democracy, good governance and protection of the environment
- Managing migration and combating illegal immigration
- Delivering high-quality support for British nationals abroad, in normal times and in crises
- Ensuring the security and good governance of the UK's Overseas Territories

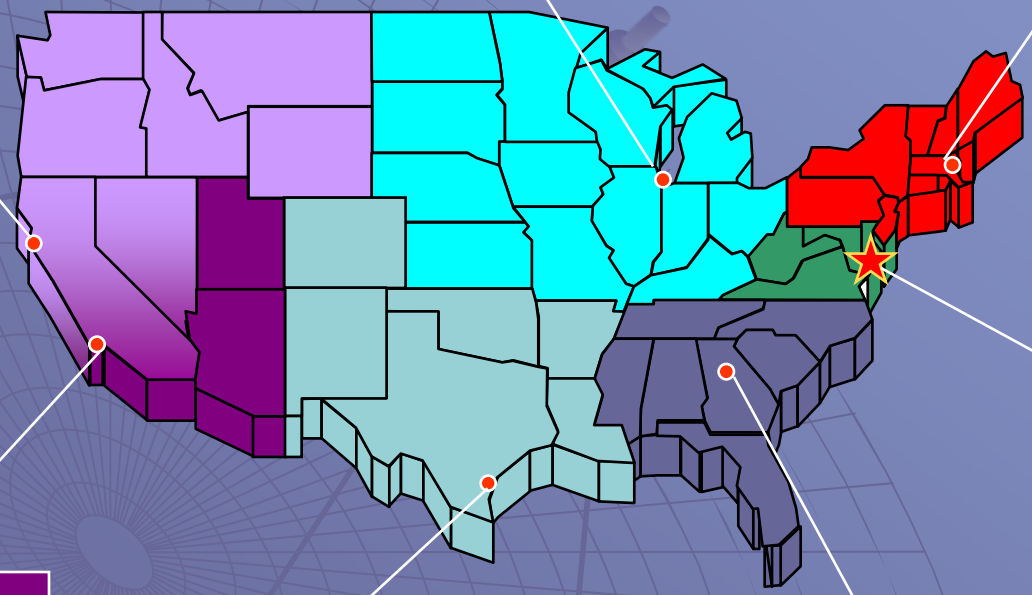
# What Does the Science & Innovation (S&I) Network Do?

- **Scientific Collaboration** – facilitating scientific collaboration between UK universities and research laboratories and their best counterparts around the world
- **Innovation** – strengthening the UK's innovation capacity through facilitating R&D partnerships and technology transfer
- **Influence** – using science and innovation as tools to communicate the UK's international strategic priorities (e.g. climate change, energy security, poverty, infections diseases, counter-terrorism)
- **Policy-making** – helping UK and overseas policy-makers develop best practice in science and innovation policy and developing international frameworks in breakthrough technologies such as stem cell research.

# Our Stakeholders

- Government Office of Science (GO Science)
- Office of the Chief Scientific Advisor
- Parliament (especially Parliamentary Committees)
- Devolved Administrations (Northern Ireland, Scotland, Wales)
- Department for Food, Environment and Rural Affairs (DEFRA)
- Department for International Development (DfID)
- Department for Innovation, Universities and Skills (DIUS)
- Department for Business Enterprise and Regulatory Reform (BERR)
- Technology Strategy Board (TSB)
- Knowledge Transfer Networks (KTNs)
- Research Councils UK (RC UK)
- UK Stem Cell Bank
- Nanotechnology Industries Associations (NIA)
- Wellcome Trust
- Individual Universities
- UK Trade & Investment (UKTI)
- Political Press and Public Affairs (PPPA)
- British Council
- **Many, Many More**

# The US S&I Network



**Chicago**
Jennifer Jackiw

**Boston**
Stefan Winkler
Naomi Ridge
Neelangi Gunasekara

**San Francisco**
Annabelle Malins
Maike Rentel
Theresa Djirbandee

**Washington, DC**
Brian Ferrar
Joshua Mandell
David Muller

**Los Angeles**
Andy Perkins
Kacey Bonner

**Houston**
May Akrawi
Catherine Santamaria

**Atlanta**
Kerry Norton

UK SCIENCE & INNOVATION

# Focus of US Network for 2008-09

- Communicating Climate Change –
  - Urgency
  - Technology, Innovation, and Energy Efficiency
  - Carbon Markets
- Stem Cells – International Regulatory Framework
- Infectious Diseases
- Science for Development
- Science Policy & Best Practice
- UK-US Collaborations
- Security Science

# General Activities

- Networking, Networking, Networking
- Facilitate / Support programs for high-level visitors (i.e. MPs and Parliamentary Committees)
- Host / Partner on hosting events
- Sector / Topical research
- Best practice exchanges (i.e. sponsored visits)
- Reporting back new developments
- Working with Public Affairs Team to promote S&I Activities

# Science & Innovation Activities in the Los Angeles Post

- Visit from Higher Education Wales to Southern California and Arizona (February 08)
- UK Stem Cell Bank tour through California (February 08)
- Caltech-Scotland Researcher Exchange Program (ongoing)
- Royal Society Visit (April 08)
- Research for Parliamentary Committee interested in areas with higher value-added economies (June 08)
- Coordinating BIO 2008 activities with UK Trade & Investment (June 08)
- Possible nanotechnology regulatory event (Fall 08)
- Possible Climate Change / Energy Efficiency events in Arizona and Nevada (Late 08)

# Educational Perspective on Public Diplomacy:

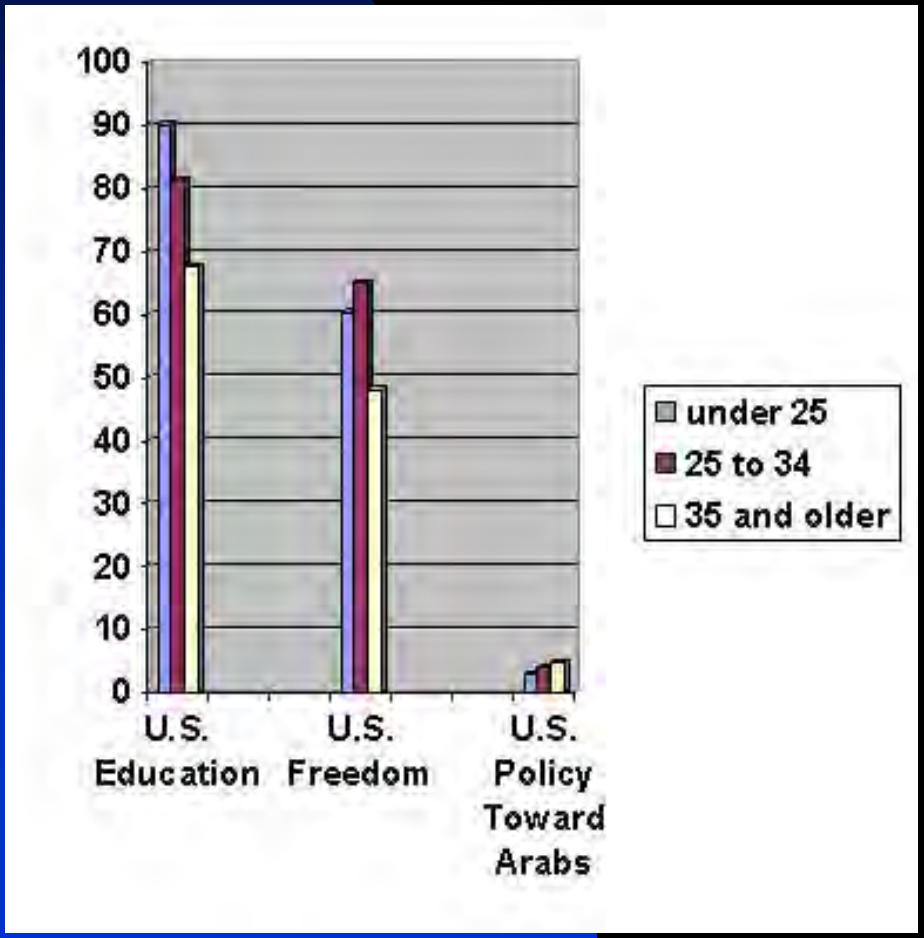
Mayya Tokman
*University of California, Merced*

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

2 hrs

1.5 hrs

# Why Use Science and Science Education in Public Diplomacy:




- Cultural perception of science and scientists

- Country's willingness to engage with US, e.g. surveys of predominantly Muslim countries

# Why Science and Math Education can be an Effective Public Diplomacy Tool:

- Engage with youth
- Learn in the process
- Address multiple desirable goals at once:
  - development objectives
  - public diplomacy
  - workforce development in US and abroad

# What's possible?

A spectrum of existing programs across federal government, public and private sectors in *formal* and *informal* education, e.g.

- curriculum development and supplemental materials,
- teacher professional development,
- science exhibits, competitions, fairs
- connecting schools with scientific communities,
- various exchange programs.

# Challenges

- Uniting sponsors
- Long term planning and commitment
- Awareness of countries sensitivities, e.g. curriculum issues

# Five Panel Themes

1. interrogative: science exchange / relationships to learn things we thought we mastered but really didn't*
2. relational: develop personal relations and institutional links to foster long-term communications below the radar*
3. capacity: create a demand to alter infrastructure of home country (laws, utilities, educations, access, etc) to build capacity*
4. projection: play to America's strength as an admired S&T leader even if policies are not so admired*
5. access: gain new access to new methods, products, ways of thinking to positively impact our national security

REALITY VISION
Instantly There.

# RealityVision

# Communications Centers Today

- Radio, Maps, and Photos
- Not Much Live Video or Geospatial Data

# RealityVision – An Entirely New Way to Share Information

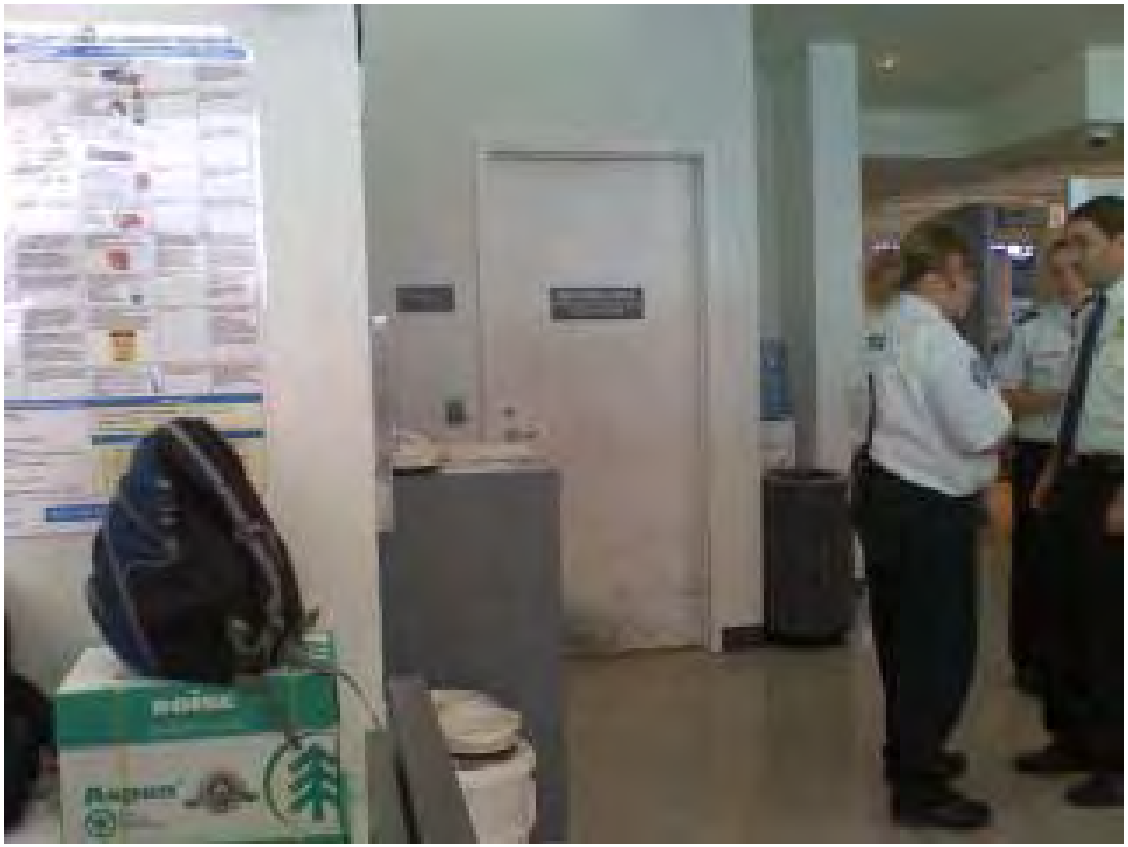
INPUT SOURCES → HOW TRANSPORTED? → REALITYVISION SOFTWARE → INSTANTLY THERE

- IP Camera Feeds
- Phone Camera Feeds
- Image Files
- GPS
- Sensors
- Other Data

- Commercial Carriers
- WiFi
- LAN
- Private IP Wireless WANs
- Satellite Networks

- Mobile Phone Client
- Remote Desktop Client
- Server
- Console

# See Events As They Happen



Arrival of the Thanksgiving Turkeys for the Presidential Pardon

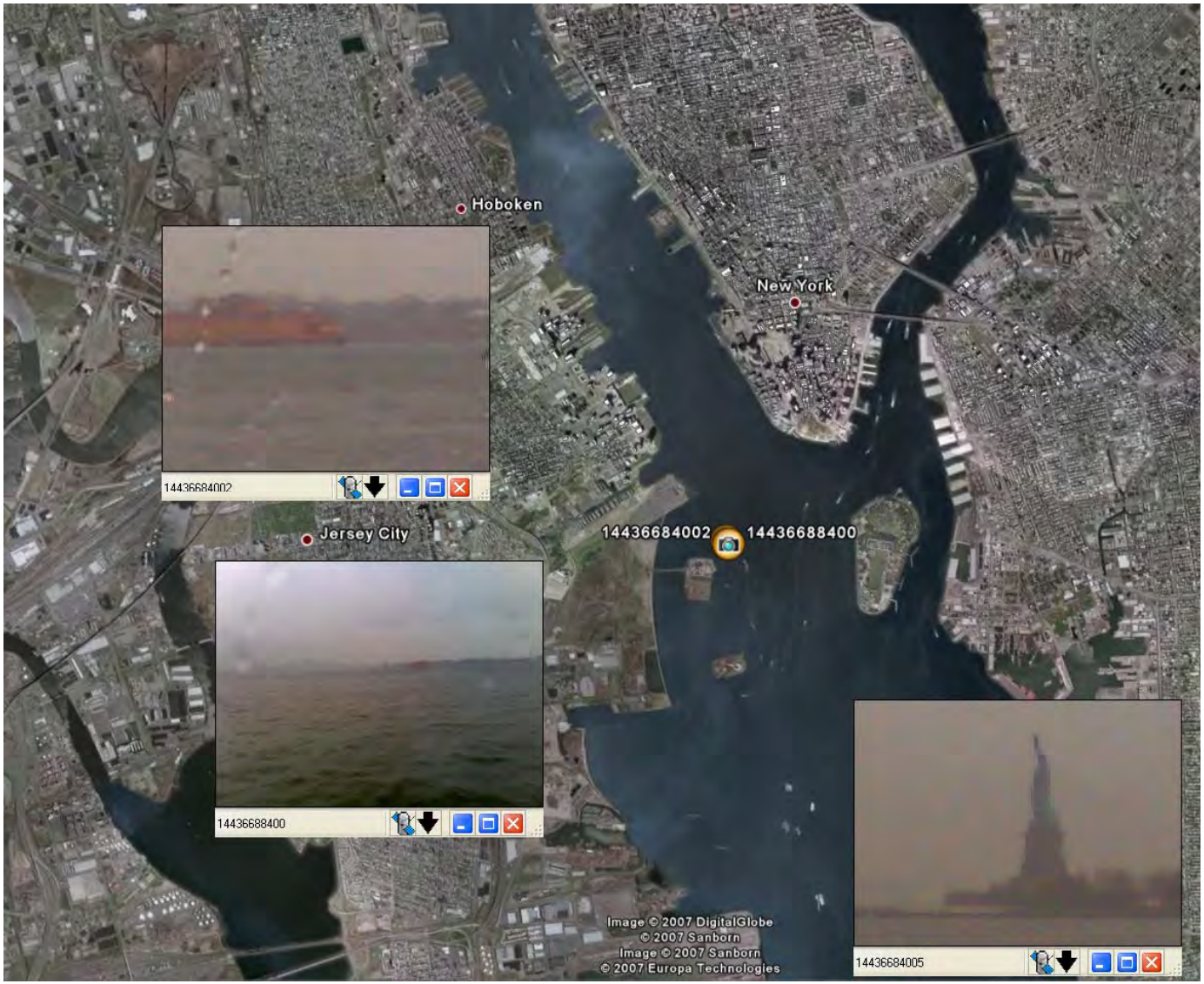
# Quality Imagery From the Video

All video is timestamped and stored with GPS data (when available) on a *frame by frame* basis.

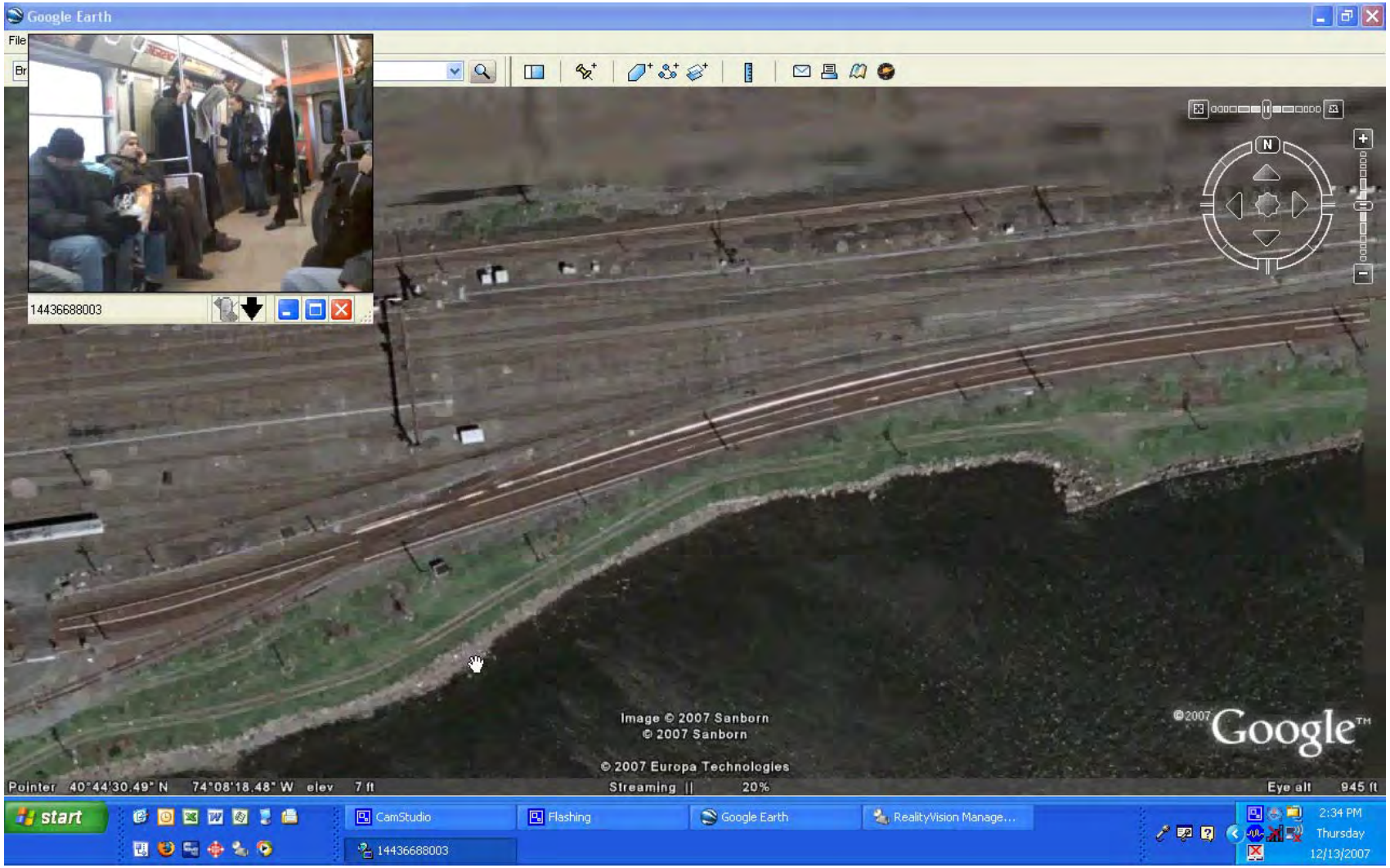
In effect, this means that video becomes easily accessible raw data that can be run through other processes such as facial recognition.

# Gain the Perspective of Your Field Personnel

# Multiple Perspectives Through Live Video Streams at Land or at Sea



# Flexible – Anywhere There is a Data Network, See What Happens at Any Speed

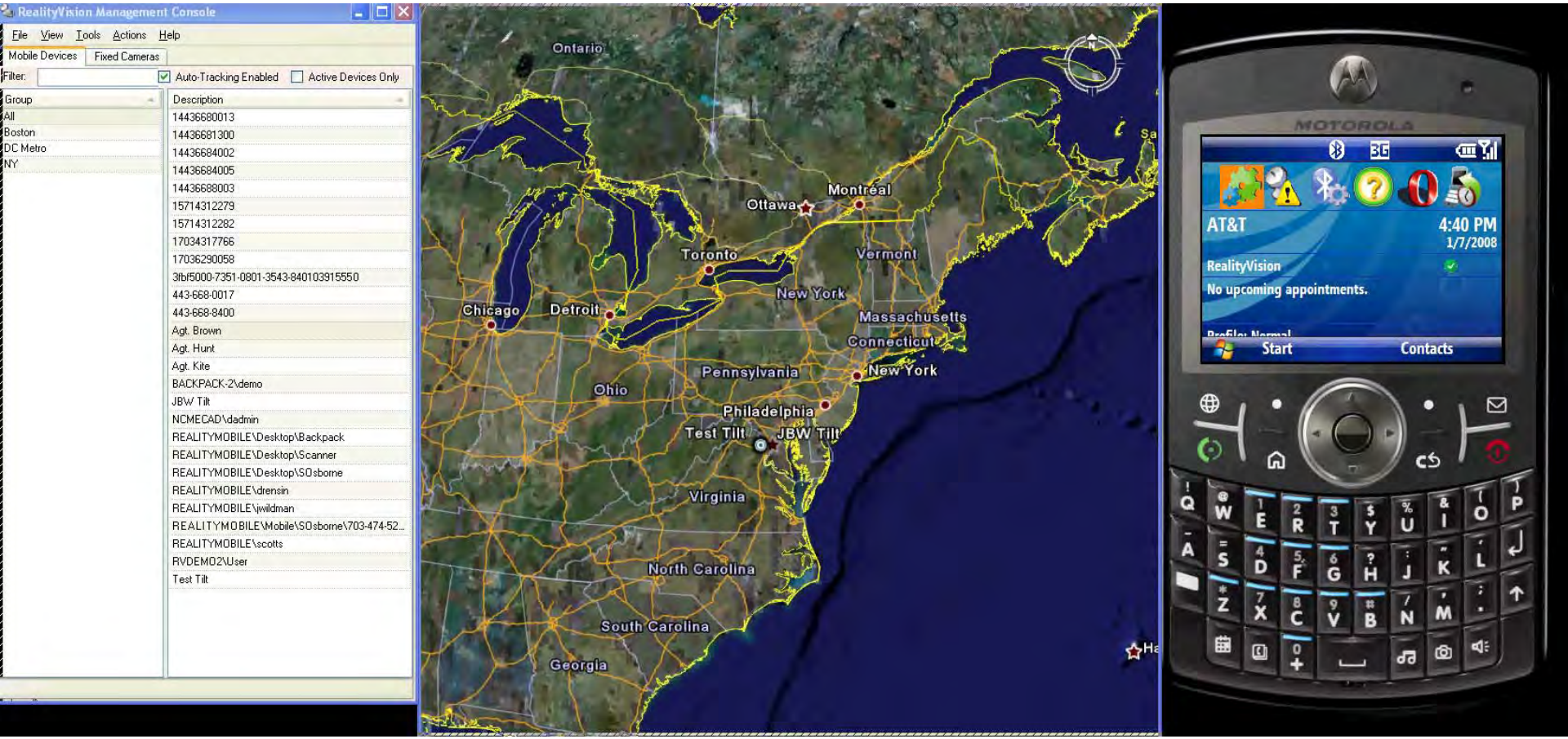


# RealityVision in Washington, DC

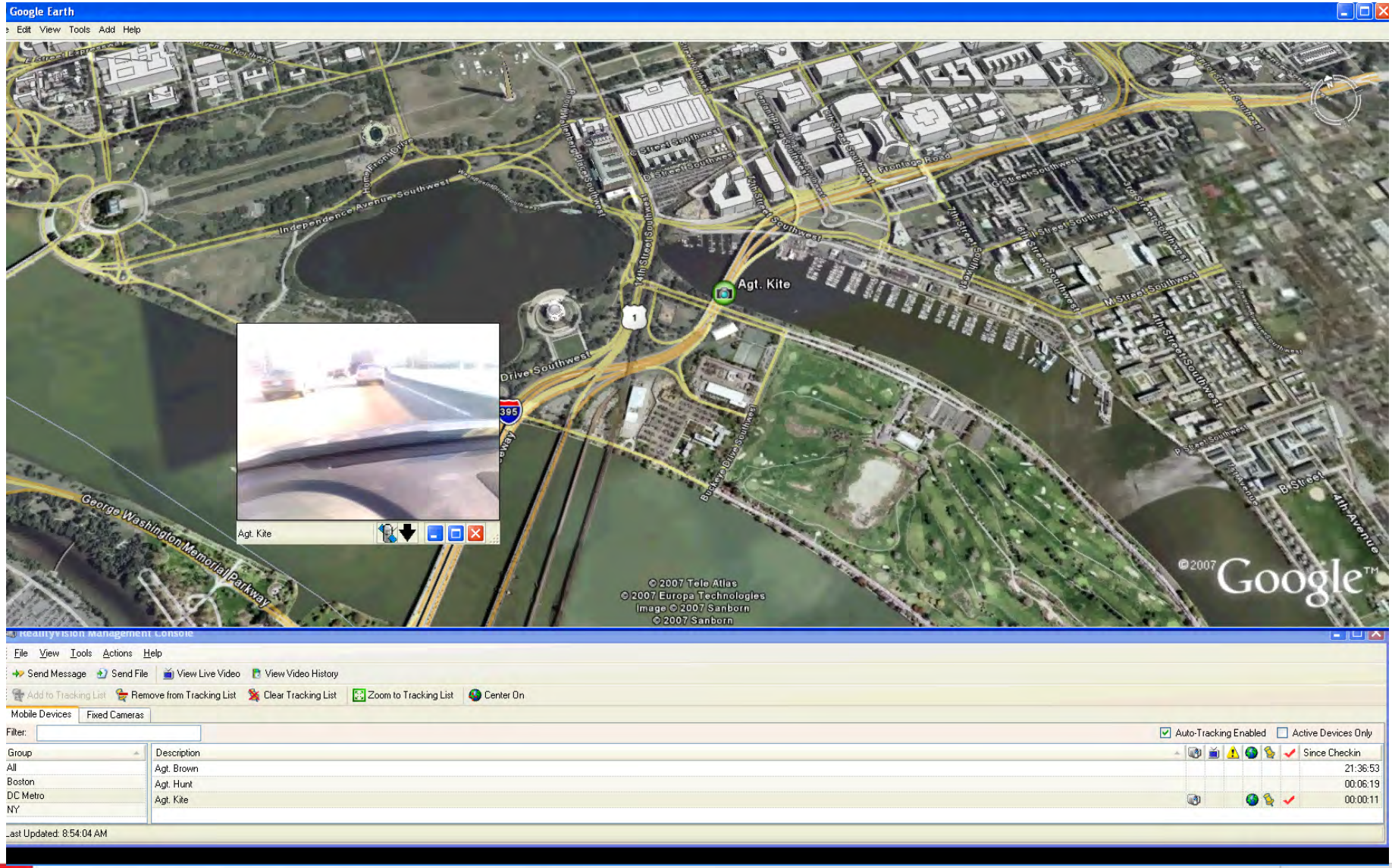
Capitol Hill Area

Jan 10, 2008

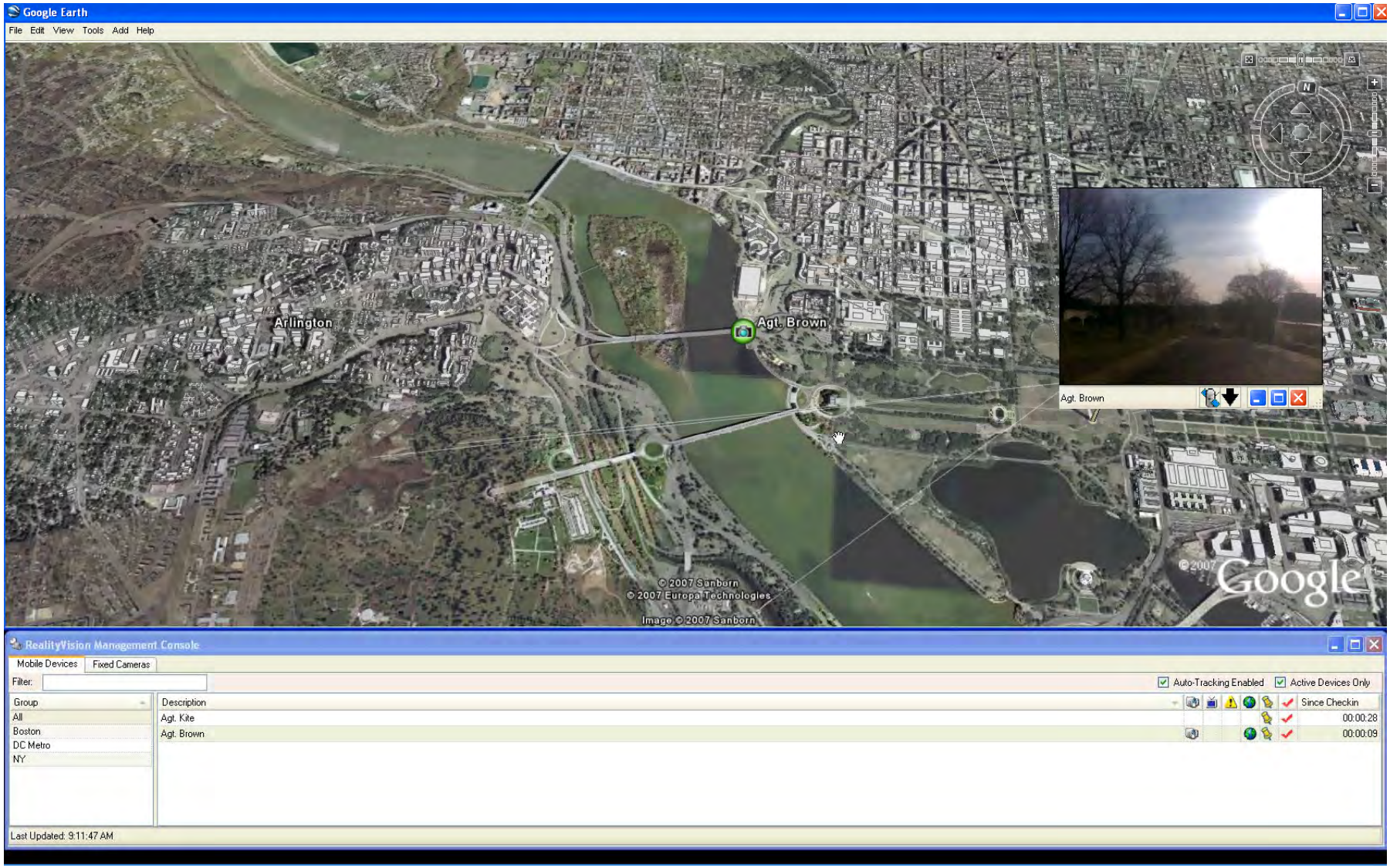
# Sending Out Textual Data



# Tracking Agent Kite into DC

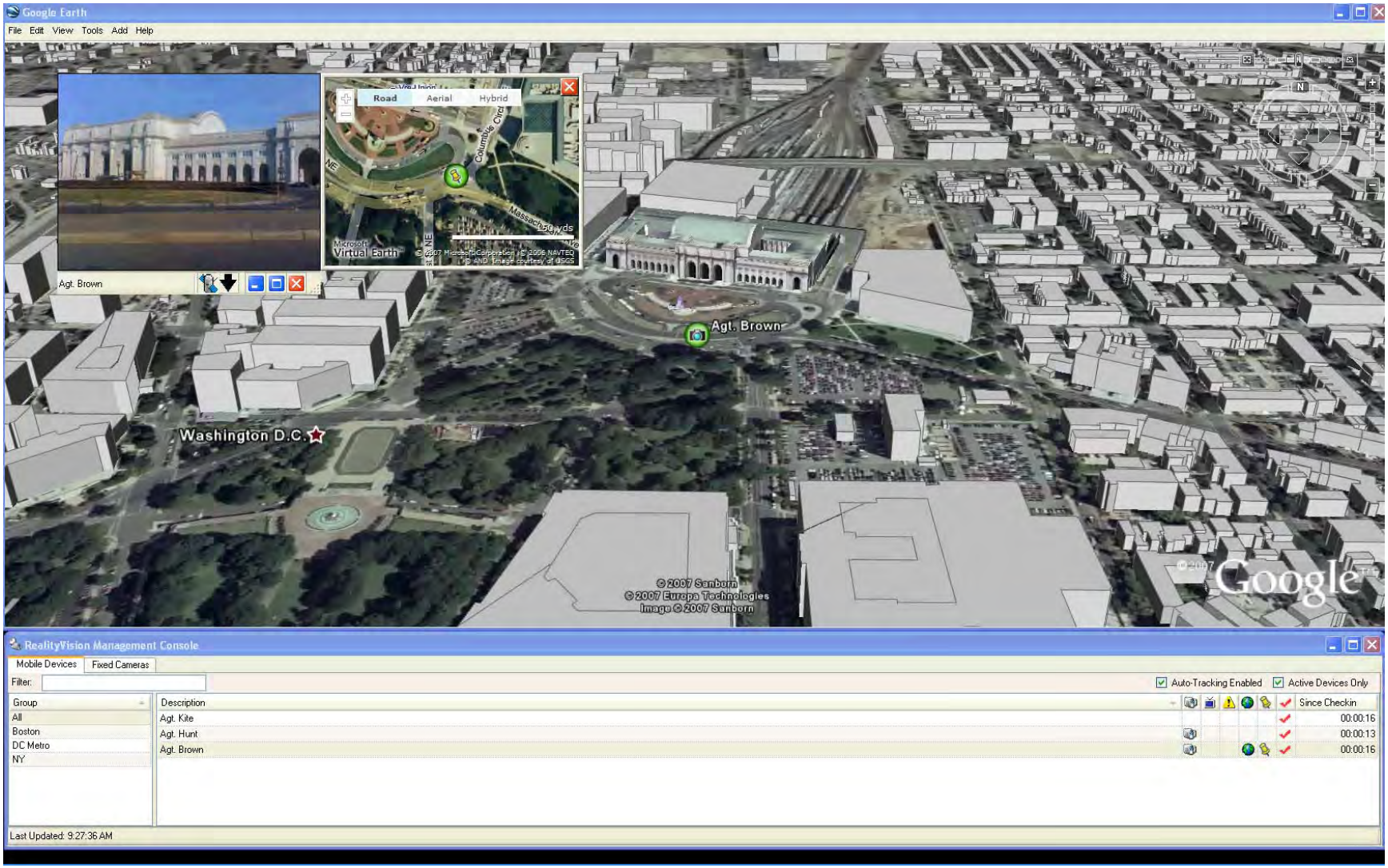


# Tracking Agent Brown into DC

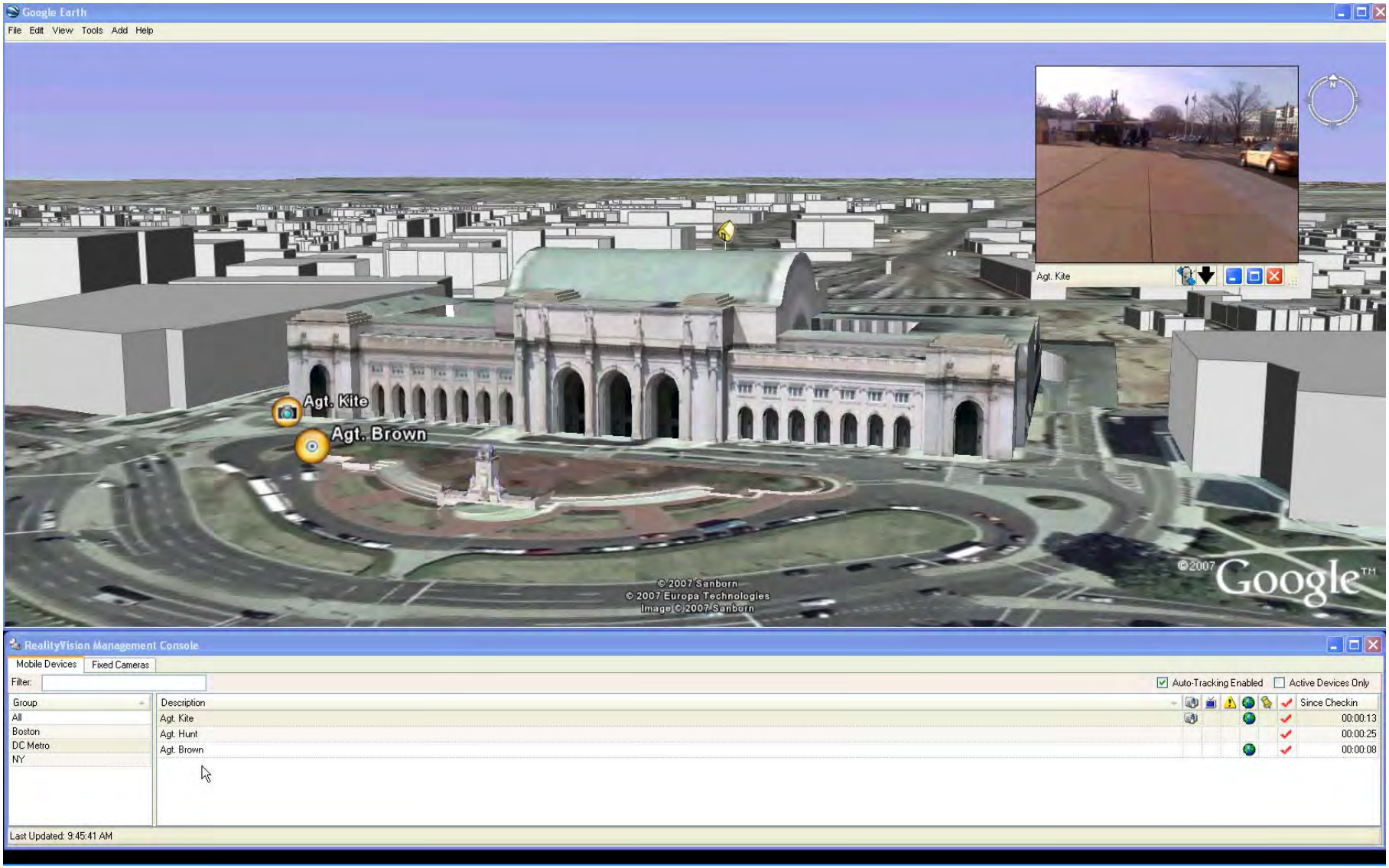


# Switching Between Agent Brown and Agent Kite

# Perspective of Video

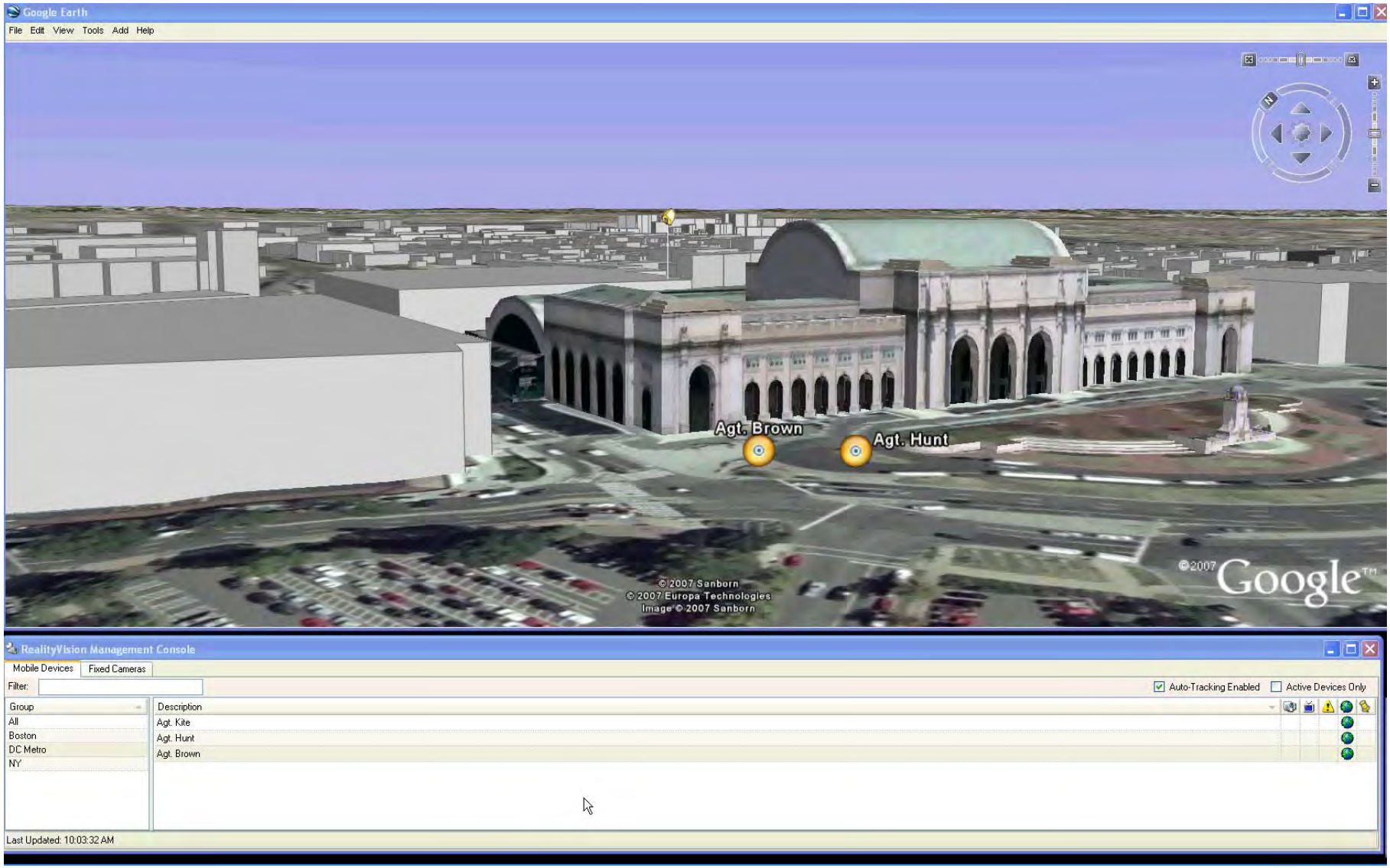


# Managing Agents in the Field

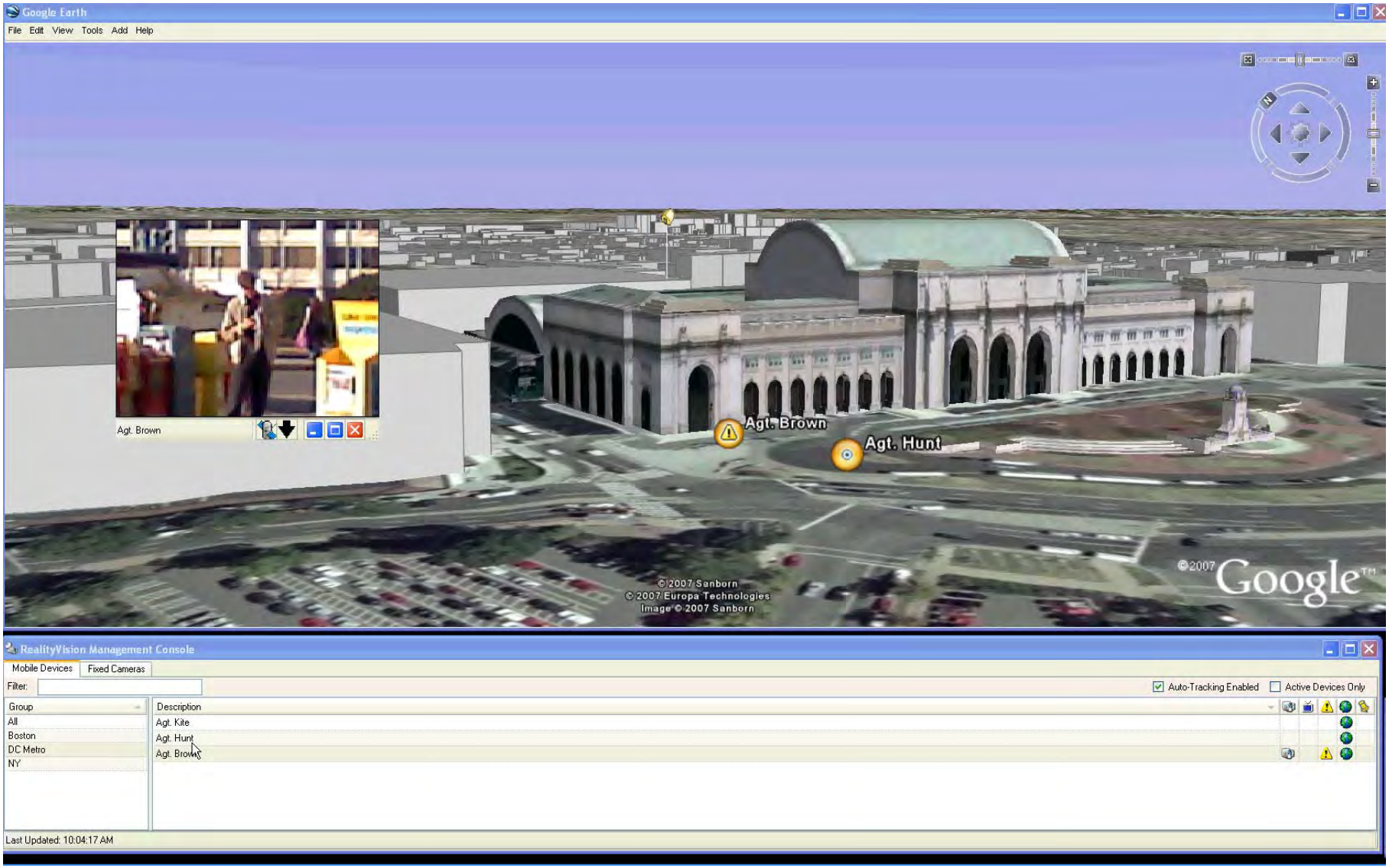


# Instantly Distributing Photos

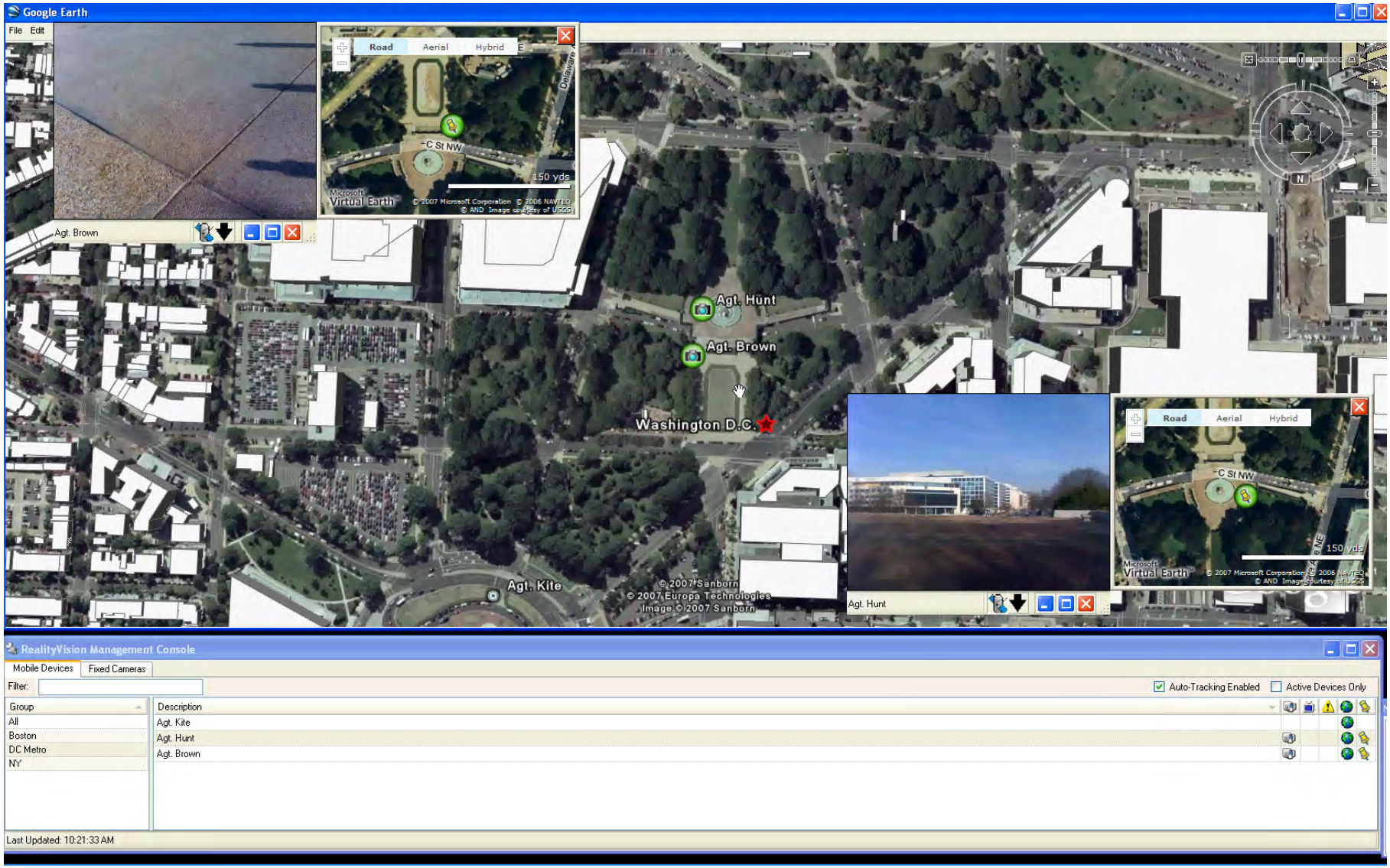
# Panic Alerts



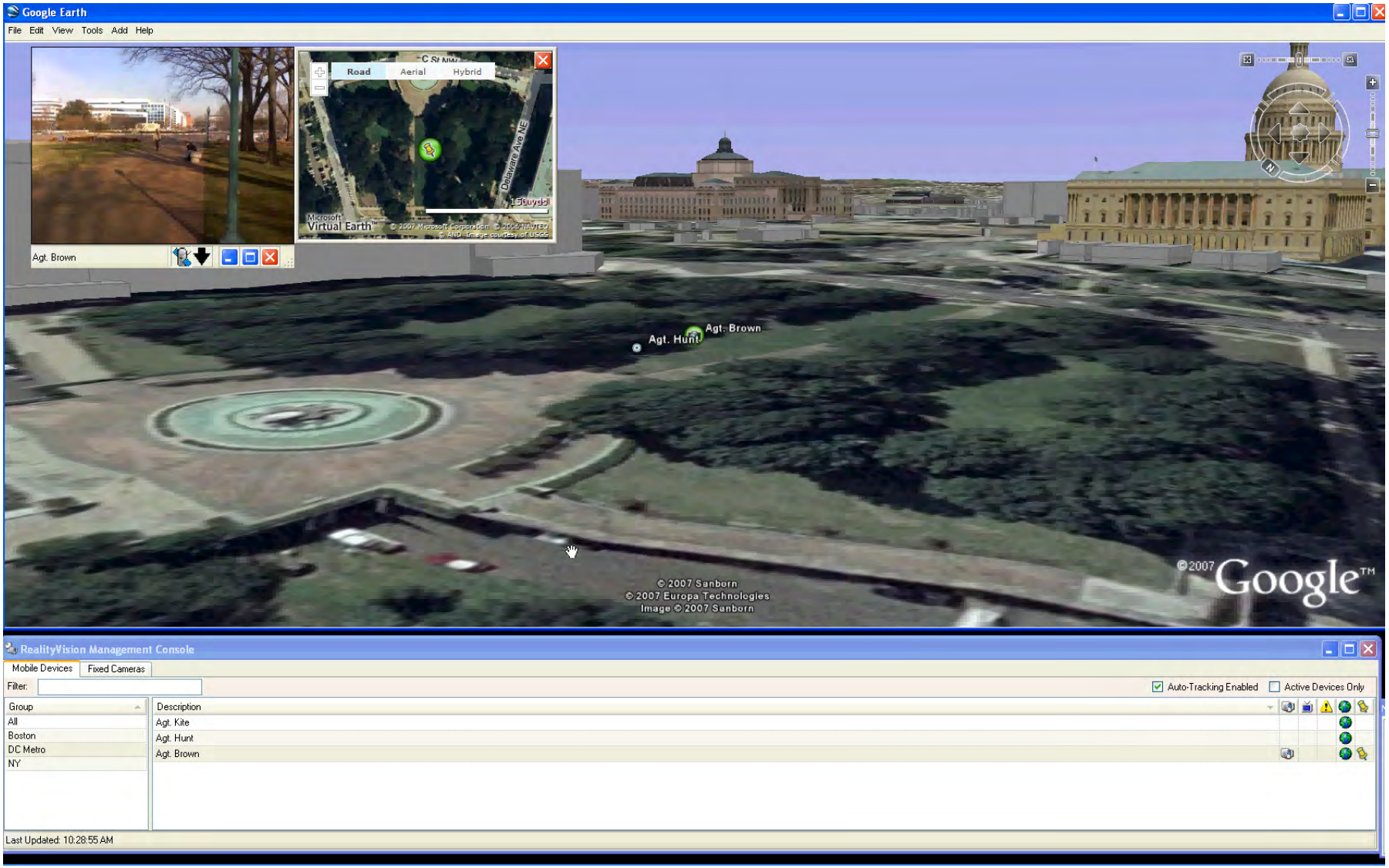
# The Same Level of Understanding



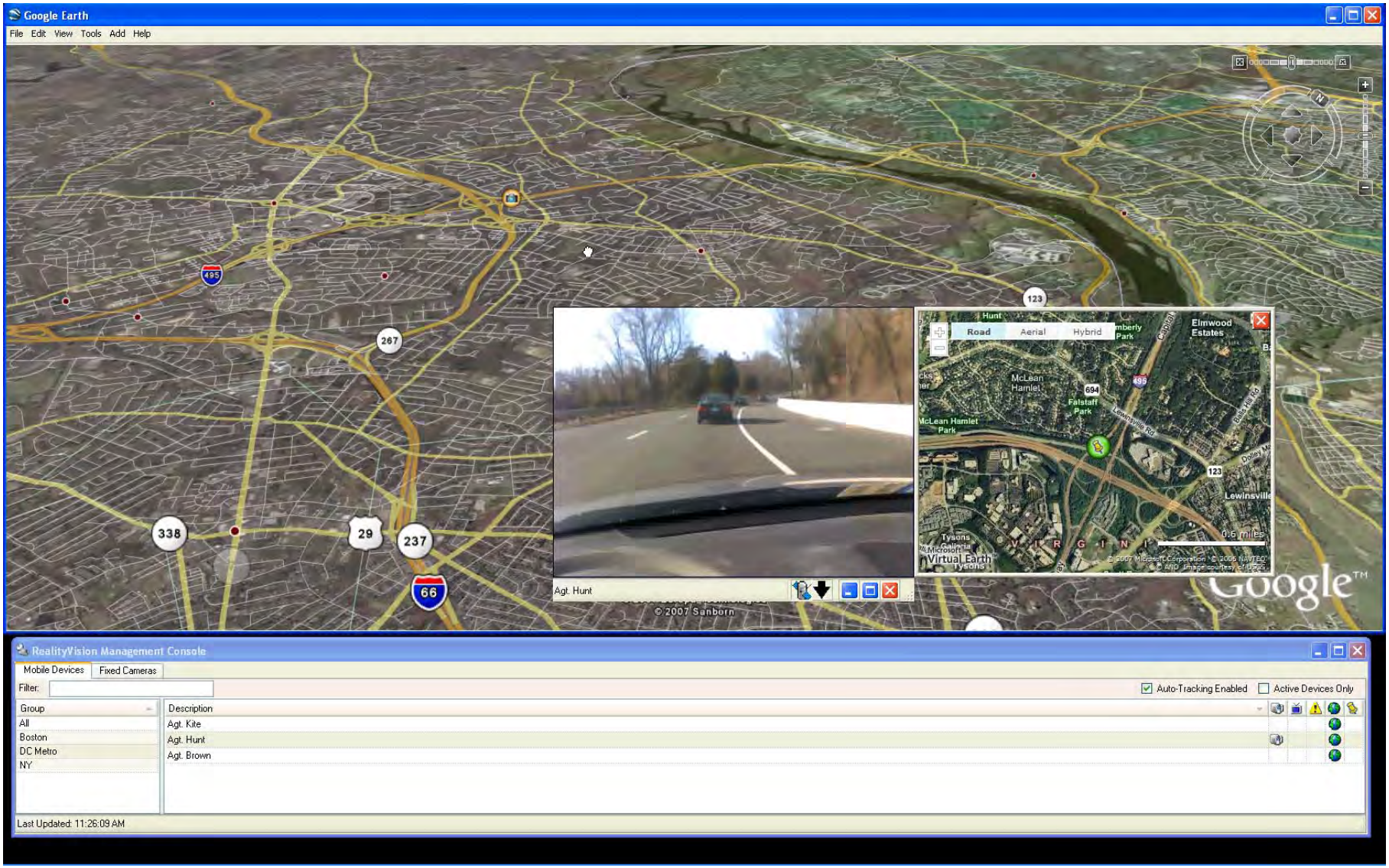
# Surveillance – Multiple Perspectives



# Documenting Unexpected Encounters



# Tracking at 60 Miles per Hour



USC Viterbi
School of Engineering

# The USC GamePipe Laboratory

Michael Zyda, Director
USC GamePipe Laboratory
Zyda@usc.edu

# The USC GamePipe Laboratory Mission

The mission of the USC GamePipe Laboratory is research, development & education on technologies & design for the future of interactive games & their application.

- from developing the supporting technologies for increasing the complexity & innovation in produced games,
- to developing serious & entertainment games for government & corporate sponsors.

GAME PIPE

# Game Development Degree Programs

BS in Computer Science (Games)

- The goal of the BS degree is to educate students capable of engineering next generation games immediately upon graduation. Students in this program receive a solid grounding in Computer Science in addition to the art and design required for functioning in the game industry.

MS in Computer Science (Game Development)

- The goal of the MS degree is to graduate professionally educated students capable of engineering next generation games and their required technologies.

Degrees started Fall 2006.

We are in our fourth semester of

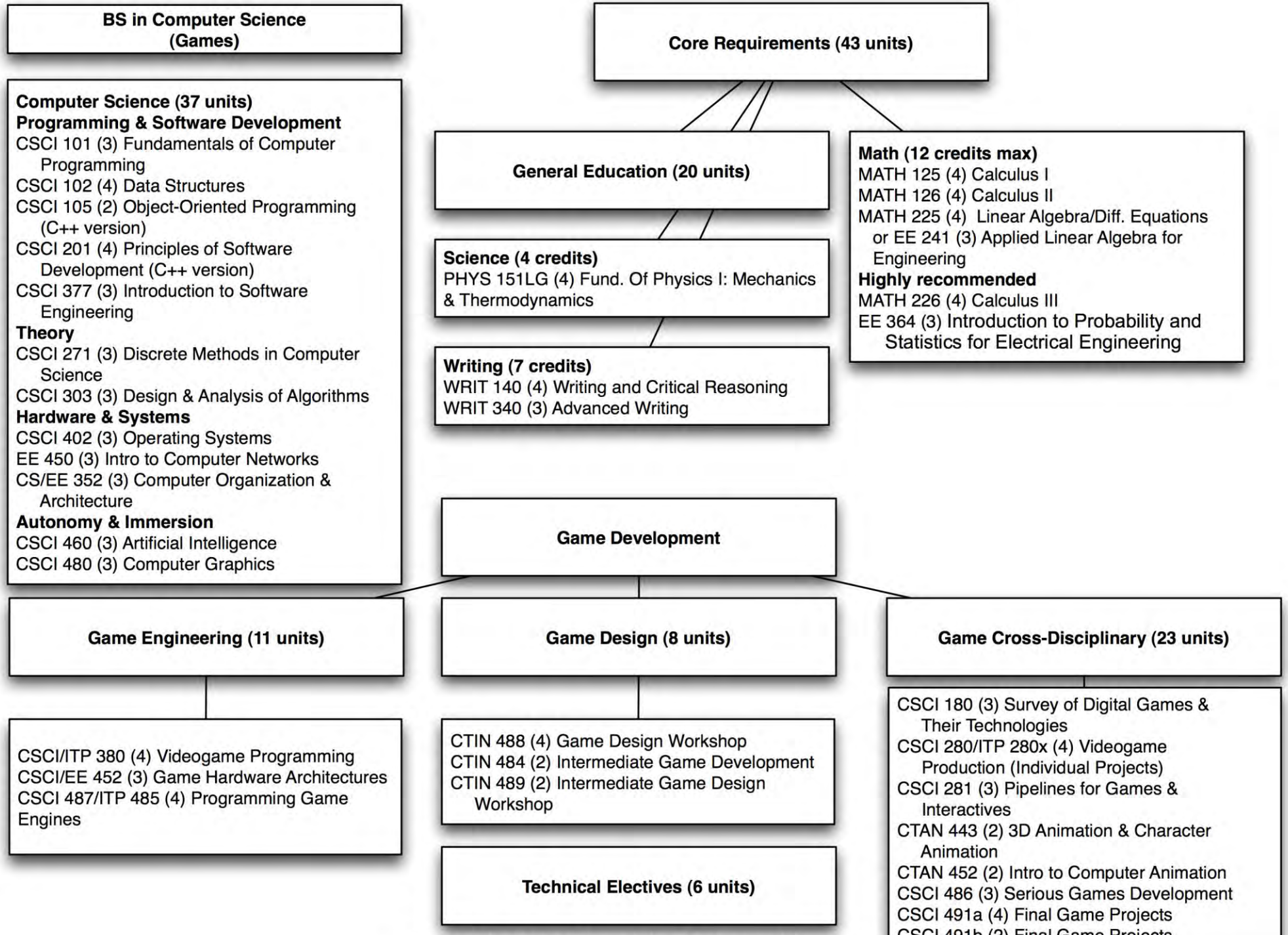



Figure 1 BS in Computer Science (Games)

**Version 8.3**

**http://gamepipe.usc.edu/Masters.html**

## MS in Computer Science (Game Development)

**CS Core (9 credits)**
**You must take the following two courses:**
CS 570 Analysis of Algorithms
CS 580 3D Computer Graphics & Rendering
**You must take one of the following courses:**
CS 555 Advanced Operating Systems
CS 561 Artificial Intelligence
(or CS 573 Advanced Artificial Intelligence)
CS 571 Web Technologies
CS 577a Software Engineering
CS 585 Database Systems
EE 557 Computer Systems Architecture

**Game Development Core (11 credits)**
CTIN 488 Game Design Workshop (4)
CS 522 Game Engine Development (4)
EE/CS 452 Game Hardware Architectures

**Electives - choose a concentration area & Complete Two Classes in That Area**
(6 credits)
Infrastructure
Cognition & Games
Immersion
Serious Games

**Project Classes (7 credits)**
CSCI 529a Advanced Game Projects (4)
CSCI 529b Advanced Game Projects (3)
(take in semester 3 and 4)

**Infrastructure**
CS 503 Parallel Programming
CS 520 Computer Animation & Simulation
CS 523 Networked Games - Design & Implementation
CS 524 Networked AI
CS 526 Advanced Mobile Devices & Game Consoles

**Cognition & Games**
CS 524 Networked AI
CS 534 Affective Computing
CS 535 Game Based Learning
CS-541 AI Planning
CS 543 Software Multiagent Systems
CS 569 Integrated Intelligent Systems
CS-573 Advanced AI

**Immersion**
CS 520 Computer Animation & Simulation
CS 523 Networked Games - Design & Implementation
CS 537 Immersive Environments
CS 538 Human Performance Engineering
CS 574 Computer Vision
CS 588 Specification & Design of UI Software
CTAN 502A Virtual Reality & Stereoscopic Animation
EE 619 Advanced Topics in Speech Recognition & Spoken Language Engineering

**Serious Games**
CS 486 Serious Games Development
CS 520 Computer Animation & Simulation
CS 535 Game Based Learning
CS 537 Immersive Environments
CS 538 Human Performance Engineering

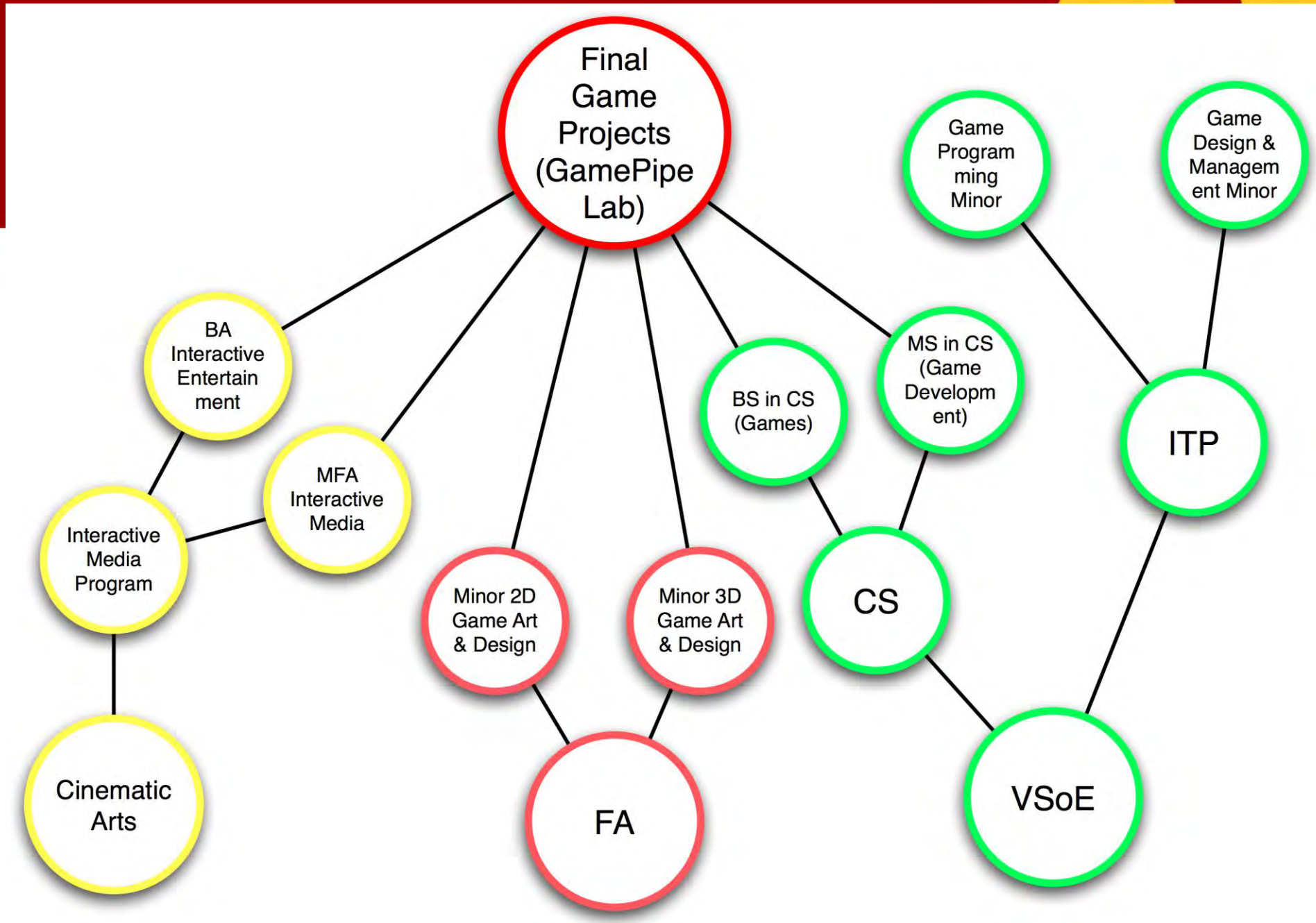
**Total (33 credits)**

# Interdisciplinary Nature of the BS/MS in Computer Science (Games) Programs

We have embedded the full game production process into the degree program ...

- from building 3D models,
- to MOCAP,
- to game animation,
- to game engine development & utilization,
- to game design & prototype development for serious & entertainment purpose.

We can build serious & entertainment games & innovative game technology using our student base, providing them real-world understanding of game development.


Final Game Projects (GamePipe Lab)
Game Programming Minor
Game Design & Management Minor
BA Interactive Entertainment
MS in CS (Game Development)
BS in CS (Games)
ITP
MFA Interactive Media
Interactive Media Program
Minor 2D Game Art & Design
Minor 3D Game Art & Design
CS
Cinematic Arts
FA
VSoE

# Interdisciplinary Nature of the BS/MS in Computer Science (Games) Programs

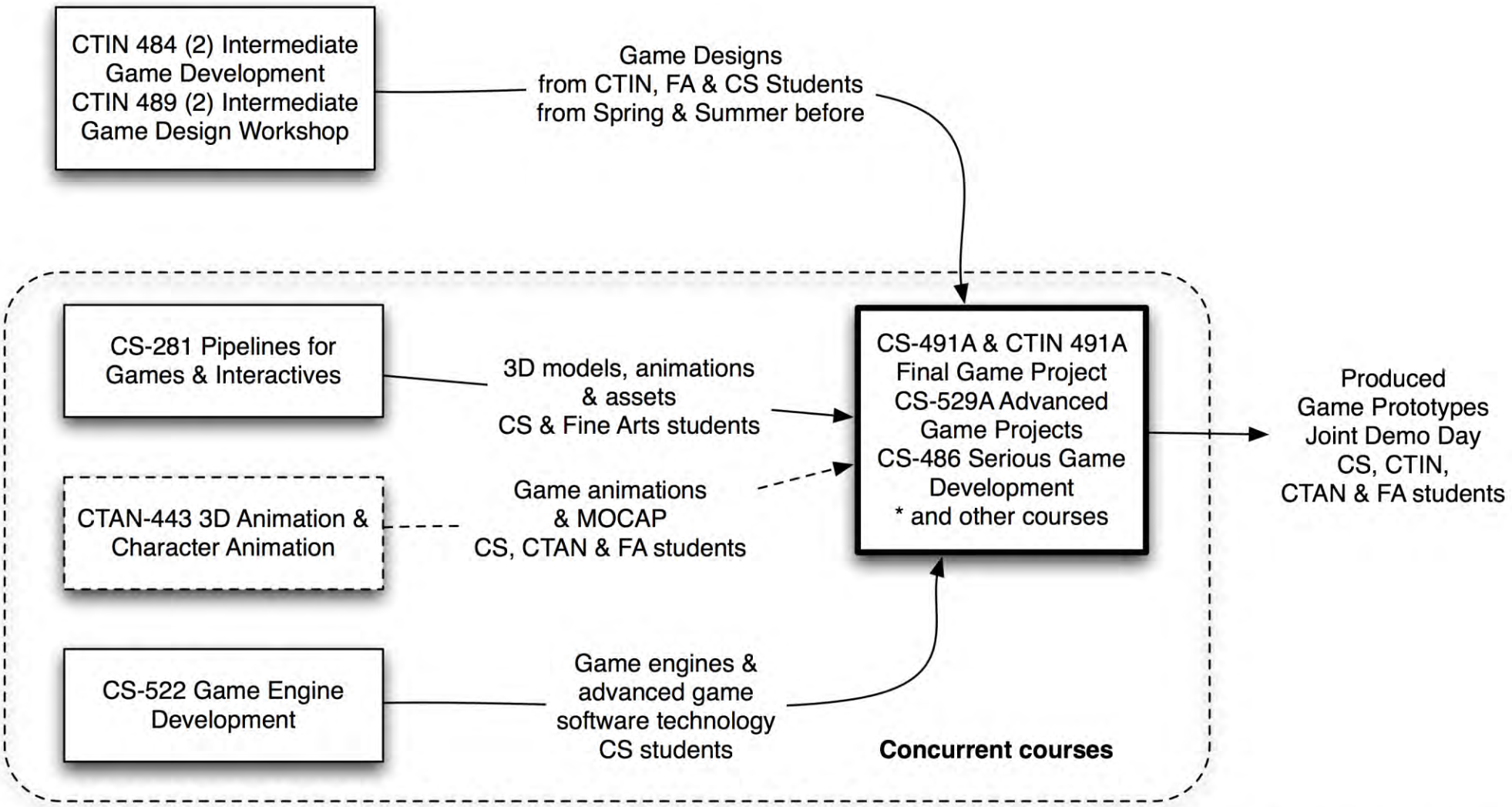



Figure 2 Cross-disciplinary coordination architecture for the Final Game Projects and Advanced Game Projects courses.

*** Other courses utilizing production pipeline:**
CS-523 Networked Games
CS-524 Networked AI
CS-526 Mobile Games

# Internship & Placement

April 2007 - we have placed 30 students/graduates into:

- EA LA, EA (Mythic Studios), EA Mobile, EA Pogo
- THQ
- Disney Interactive (formerly Disney Buena Vista Games), Disney VR Studios
- Activision - Central Technology Group
- Blizzard, Apple, Emsense, Big Huge Games, 7 Studios
- Plus students to - Google, Cisco, Ebay, Adobe, Microsoft

# Demo Day 18 December 2007 Attendance

- Sony Online Entertainment
- Sony Computer Entertainment of America
- EA - Mobile, LA
- Activision
- THQ
- Digital Domain
- Seven Studios
- iSportGames
- Lockheed Martin
- Paramount Digital Entertainment
- Disney - Animation, Interactive, & VR Studios
- Emsense
- Motorola
- Applied Minds
- Northrup Grumman
- Big Stage
- Sandia National Labs
- Konami
- Lucas Arts
- Pandemic
- Insomniac Games
- NaughtyDog

# Serious Games & Sponsored Efforts

CS-486 Serious Games Development teaches our students how to build games for serious purpose with an interested sponsor.

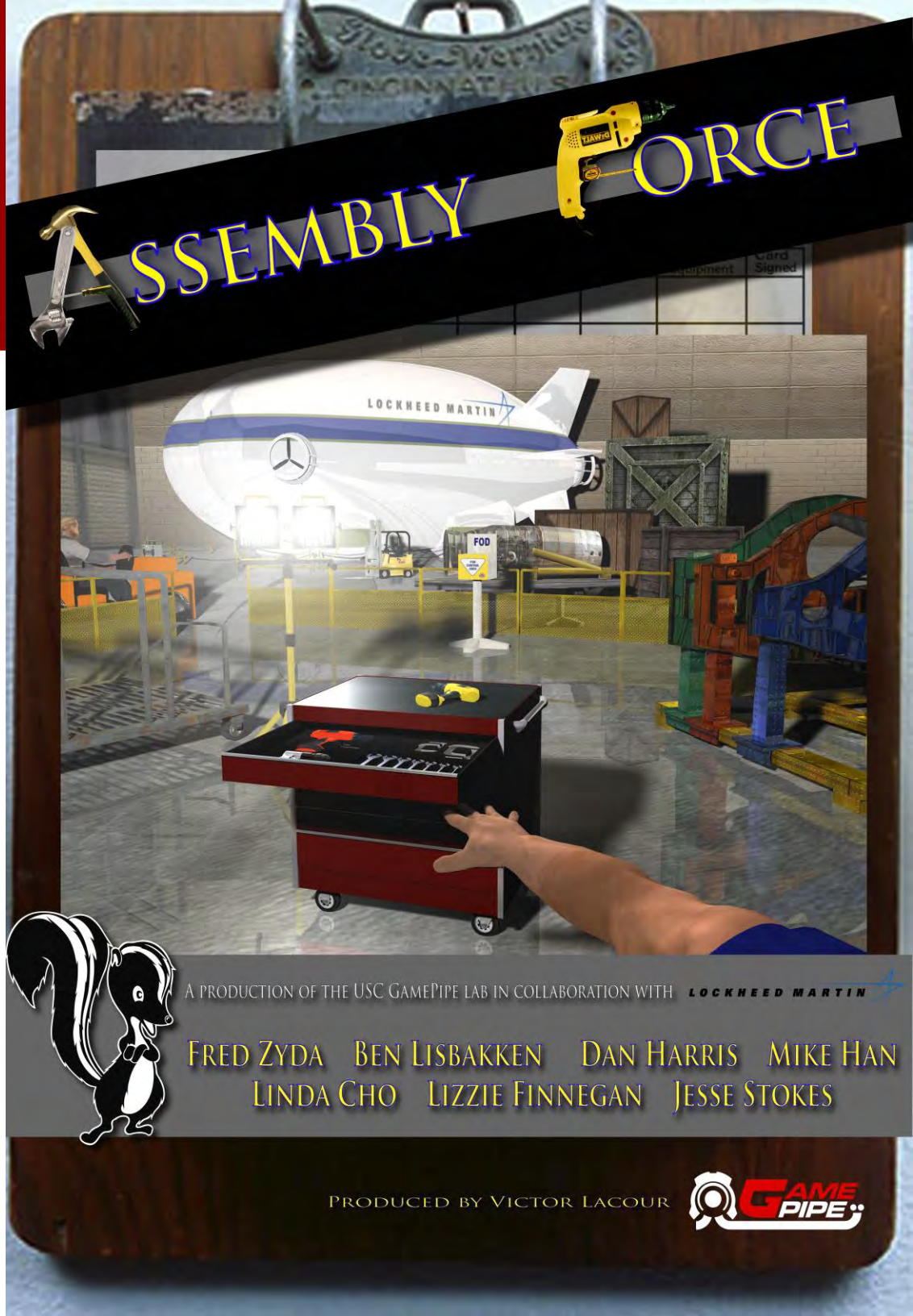
- Sponsors provide funding and work directly with the student teams, providing students the experience of working for a well-directed client.
- We had significant funding directed towards CS-486 in the last year, with that funding used to enhance the GamePipe Laboratory & to fund additional student labor for talents not in the CS-486 course.

# Assembly

Assembly layout game built for Lockheed Martin Skunk Works as proof-of-principle for serious games.

Sponsor: Lockheed Martin Skunk Works

- donation

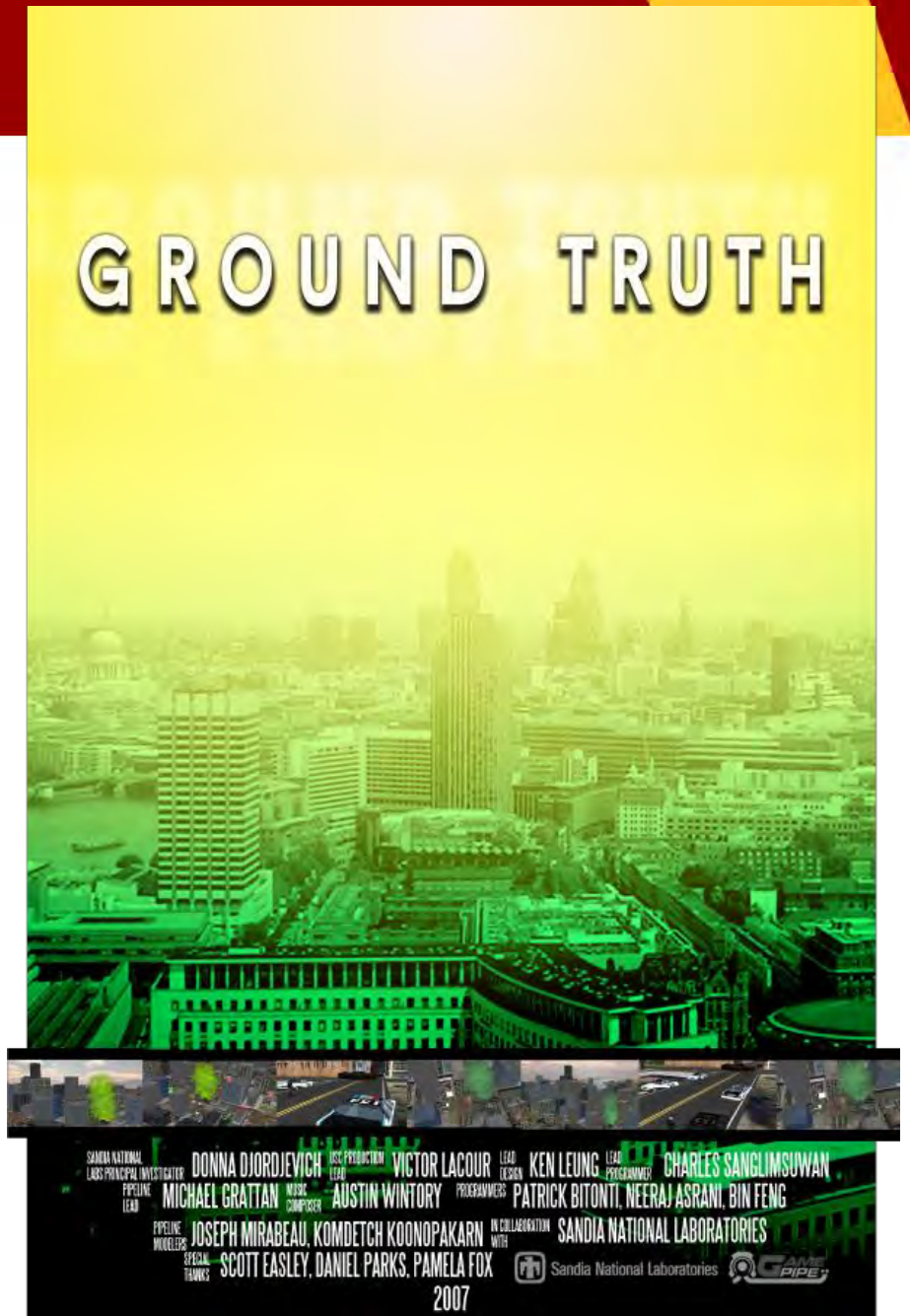


# Ground Truth

Ground truth incident commander game built for Sandia National Labs

Sponsor: Sandia National Labs

- Grant & promise of 2 more years of funding beginning Spring 2008



# FireScope - Incident Commander

Incident commander training game built for the Los Angeles Fire Department

Funded by DHS through USC CREATE

- Grant

# Immune Attack

Funded by: National Science Foundation -

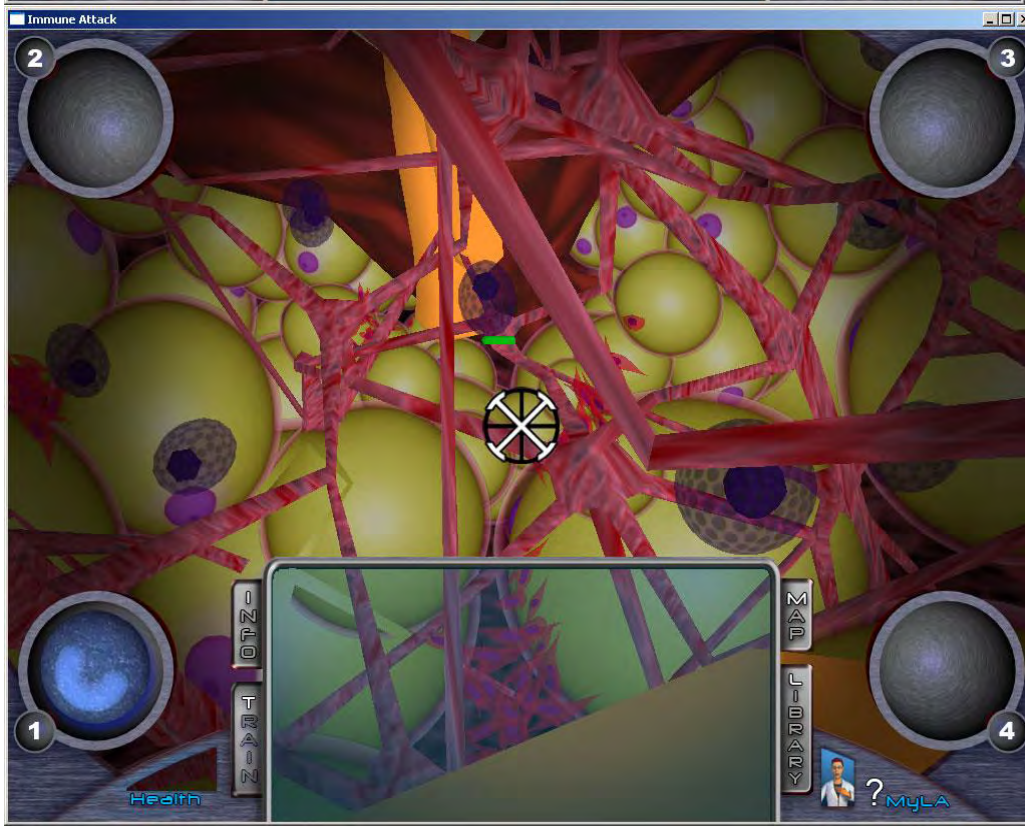
Collaborators:

- Brown University, Federation of American Scientists, USC
- USC's Game Innovation Lab (Cinema)
- USC's GamePipe Lab (Engineering)

Topic: Immunology

Platform: PC

Target Audience: AP biology students

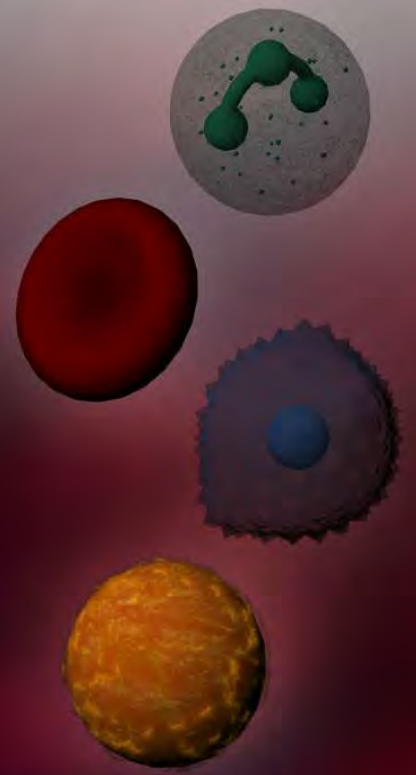


# IMMUNE ATTACK

No one could ever explain why. Your immune system was present, but could not fight invading pathogens. A single germ, a single infection, would kill you.

Sealed away behind glass walls all your life, you have developed a highly sophisticated nanoprobe to train your own immune cells to resist infection. But to train these cells, you'll have to expose yourself to infectious agents and defeat them, one by one.

If you succeed, you'll live a normal life. If not... you'll die.

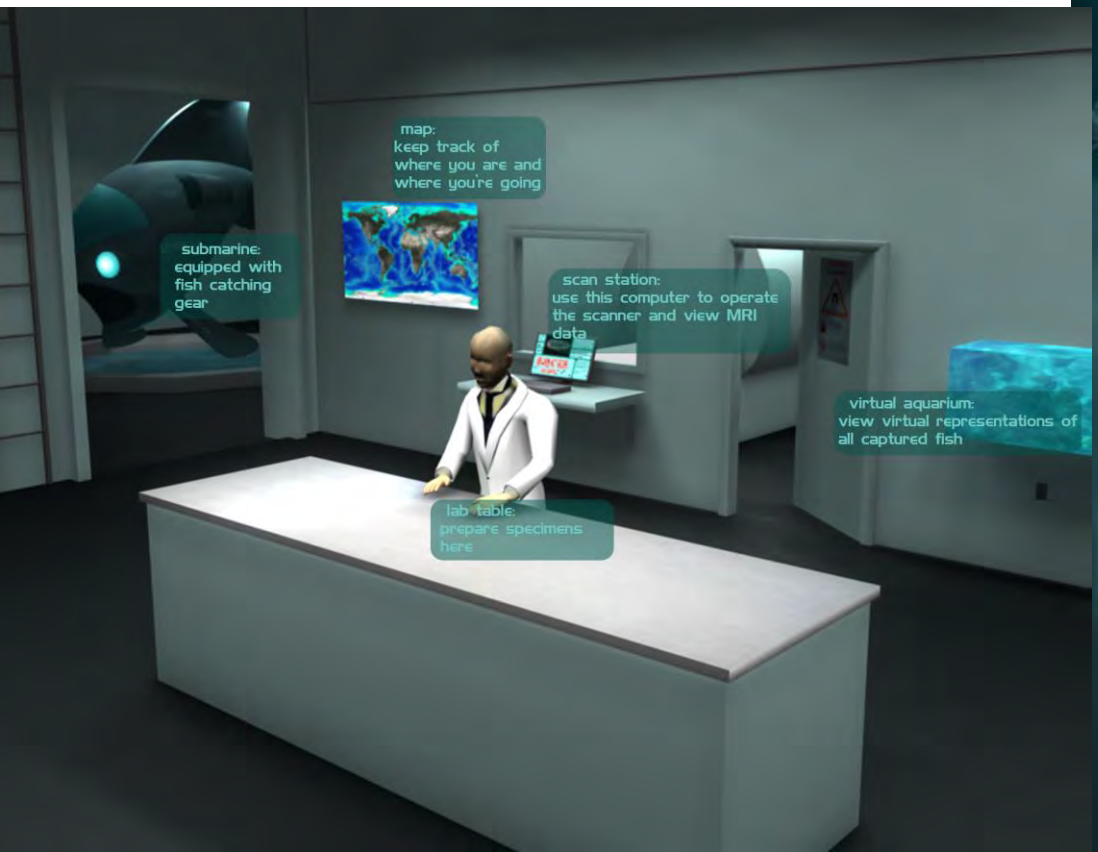


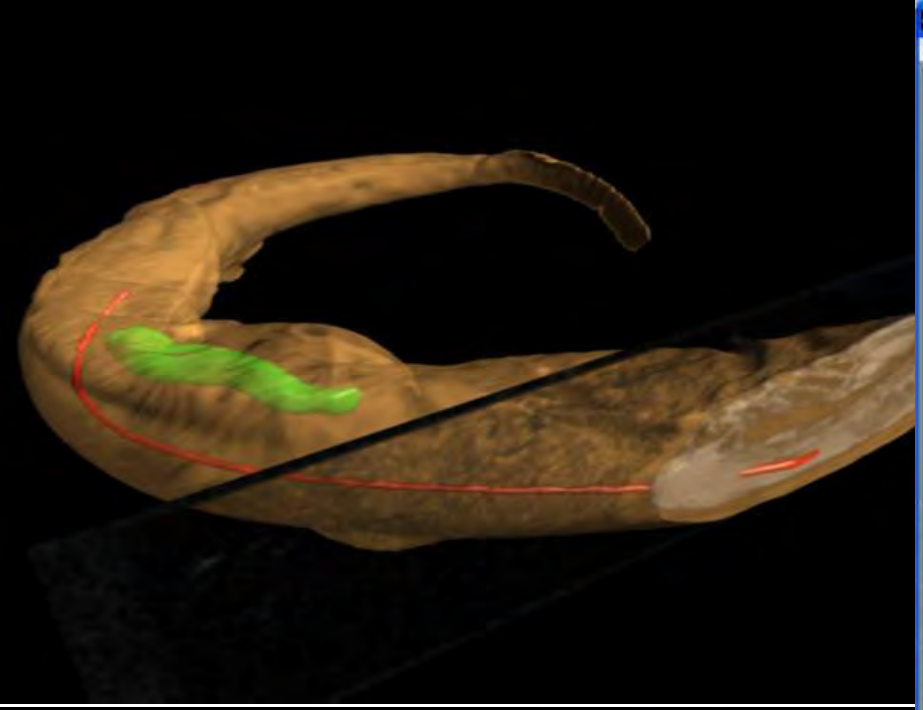
Immune Attack is an educational video game jointly developed by the Federation of American Scientists, Brown University, and the University of Southern California

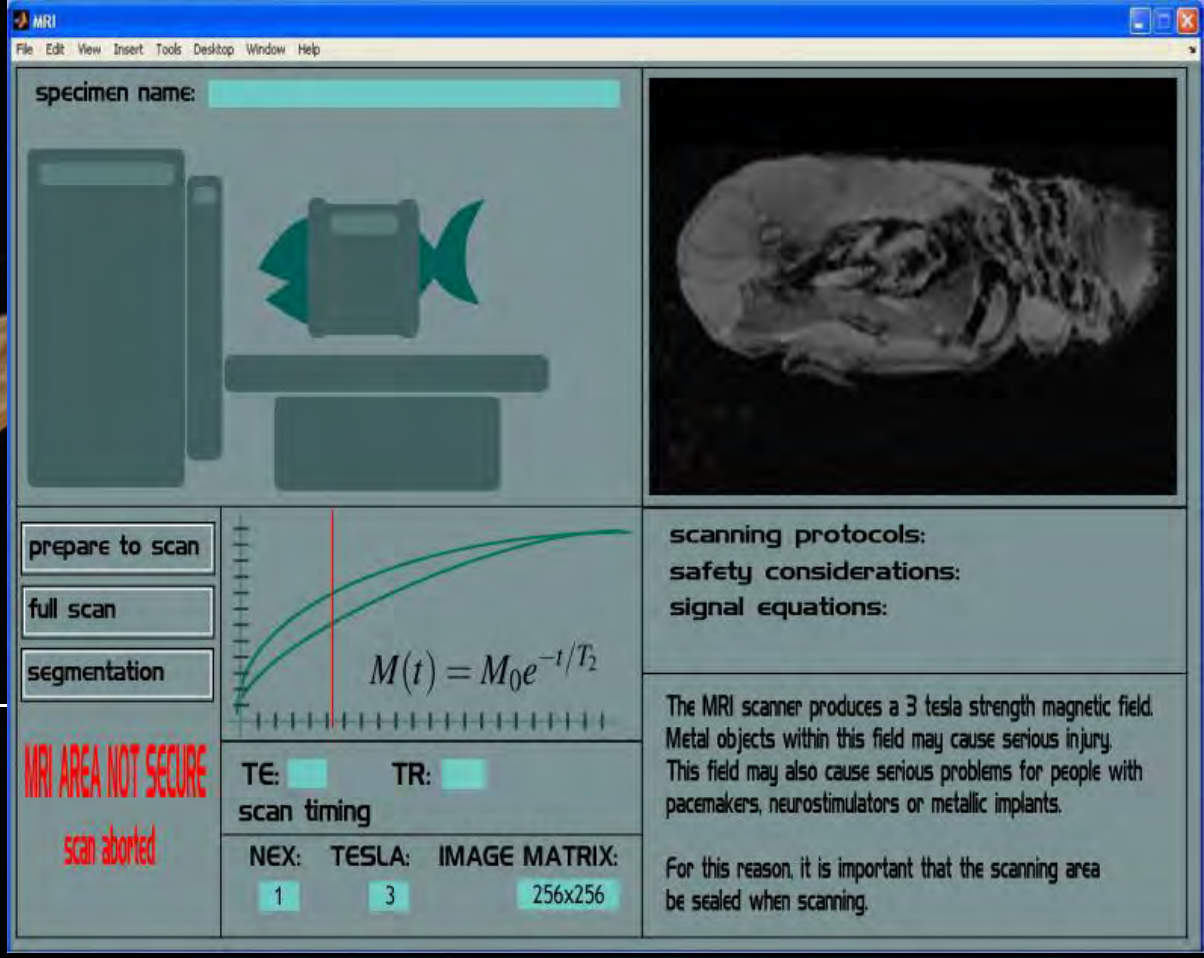
# Fish Quest

## Funded by NSF

- Grant with UCSD






MRI
File Edit View Insert Tools Desktop Window Help
specimen name:
prepare to scan
full scan
segmentation
MRI AREA NOT SECURE
scan aborted
$M(t) = M_0 e^{-t/T_2}$
TE:
TR:
scan timing
NEX:
TESLA:
IMAGE MATRIX:
1
3
256x256
scanning protocols:
safety considerations:
signal equations:
The MRI scanner produces a 3 tesla strength magnetic field. Metal objects within this field may cause serious injury. This field may also cause serious problems for people with pacemakers, neurostimulators or metallic implants.
For this reason, it is important that the scanning area be sealed when scanning.

SIO
MYRKA-I
NOT A STEP

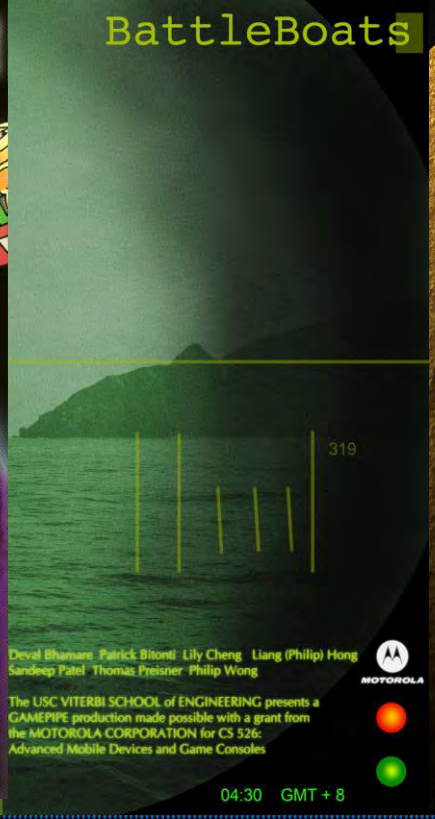
equipment and upgrades
lures:
shrimp $10
anchovy $15
garbage $5
hull integrity:
20% free
50% $10,000
100% $50,000
engine:
standard free
super $30,000
engine: standard
funds: $10,000
SIO
MYRKA-I
x 5
x 0
x 2
hull: 20%
exit

# Motorola Collaboration - Games & Next Generation Phones

- Bluetooth
- Wi-fi
- Voice recognition
- Next generation touch screen phones
- How to make mobile games on these phones fun!
  - Donation provided to create CS-526 Advanced Mobile Games course.

GAME PIPE

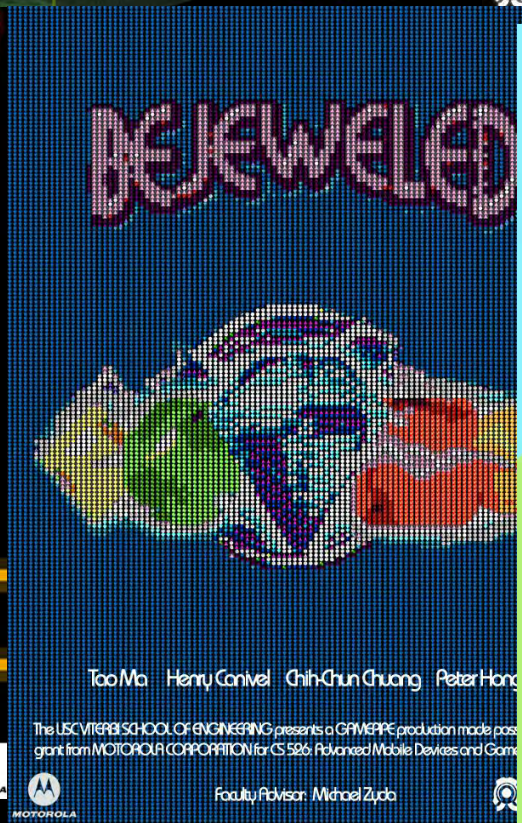
MOTOROLA
GAME PIPE
STARQUAKE
Cheng-Nan Hsieh (James) Chih-Hao Chen (Joseph)
Kai-Yang Hsiao (Sky) Ting-Kuang Wei (Tony)
The USC VITERBI SCHOOL OF ENGINEERING presents a GAMEPIPE production made possible with a grant from MOTOROLA CORPORATION for CS 526: Advanced Mobile Devices and Game Consoles.
Faculty Advisor: Michael Zyda

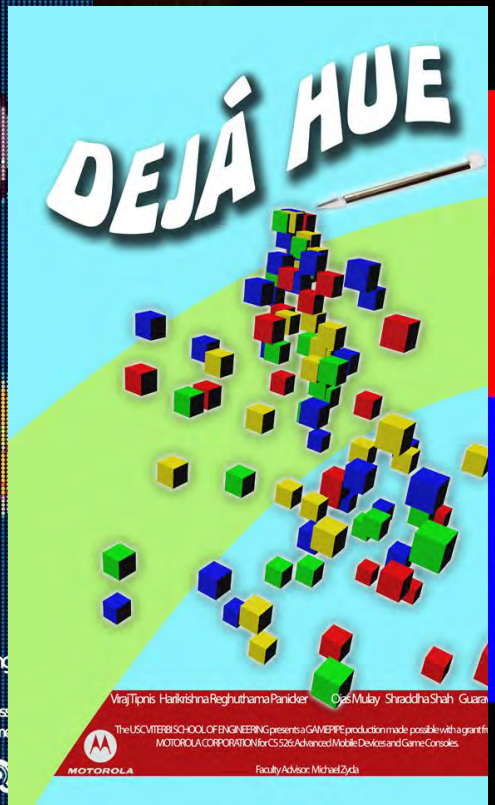

BattleBoats
319
Deval Bhamare Patrick Bitonti Lily Cheng Liang (Philip) Hong
Sandeep Patel Thomas Preisner Philip Wong
MOTOROLA
The USC VITERBI SCHOOL of ENGINEERING presents a GAMEPIPE production made possible with a grant from the MOTOROLA CORPORATION for CS 526: Advanced Mobile Devices and Game Consoles
04:30 GMT + 8

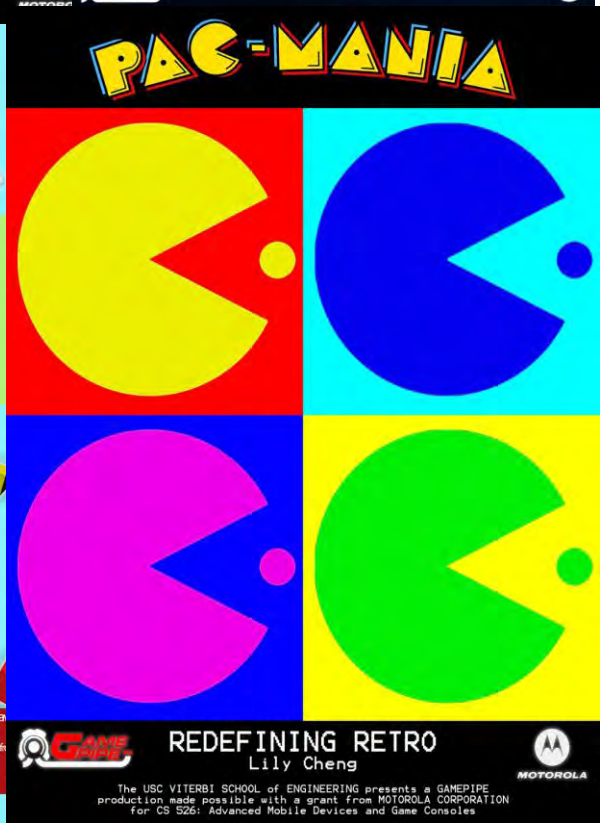
TITAN
Lily Cheng Michael Flanigan Kwan Woo Park Lei Tang Xiangyu Wu Ji Zha
The USC VITERBI SCHOOL of ENGINEERING presents a GAMEPIPE production made possible with a grant from MOTOROLA CORPORATIO for CS 526: Advanced Mobile Devices and Game Consoles
GAME PIPE
MOTOROLA

FINGER FOOTBALL
SAMEERKUMAR BENDAPUDI | GAURAV OSWAL | SIDDHARTH RAISONI
DEVIN ROSEN | GAURAV RANDHIR SINGH SIDHU
THE USC VITERBI SCHOOL OF ENGINEERING PRESENTS A GAMEPIPE PRODUCTION
MADE POSSIBLE BY GRANT FROM MOTOROLA CORPORATION
A ADVANCED MOBILE GAMES RELEASE
GAME PIPE
MOTOROLA

SLOOOL IN STYLUS
Setting fire to a phone near you...
GAME PIPE
MAUNIC DHARIA, PAMELA FOX, ARPAN NANAVATI,
MIN QIN, FRED ZYDA, SUMEET JAKATDAR
MOTOROLA


BEJEWELED
Too Ma Henry Comvel Chih-Chun Chuang Peter Hong
The USC VITERBI SCHOOL OF ENGINEERING presents a GAMEPIPE production made poss
grant from MOTOROLA CORPORATION for CS 526: Advanced Mobile Devices and Game
Faculty Advisor: Michael Zyda
MOTOROLA


DEJÁ HUE
Viraj Tipnis Harikrishna Reghuthama Panicker Ojas Mulay Shraddha Shah Guara
The USC VITERBI SCHOOL OF ENGINEERING presents a GAMEPIPE production made possible with a grant fr
MOTOROLA CORPORATION for CS 526: Advanced Mobile Devices and Game Consoles.
MOTOROLA
Faculty Advisor: Michael Zyda


PAC-MANIA
GAME PIPE
REDEFINING RETRO
Lily Cheng
MOTOROLA
The USC VITERBI SCHOOL of ENGINEERING presents a GAMEPIPE
production made possible with a grant from MOTOROLA CORPORATION
for CS 526: Advanced Mobile Devices and Game Consoles

# Social Models & MMOGs

Models that watch game play & play back

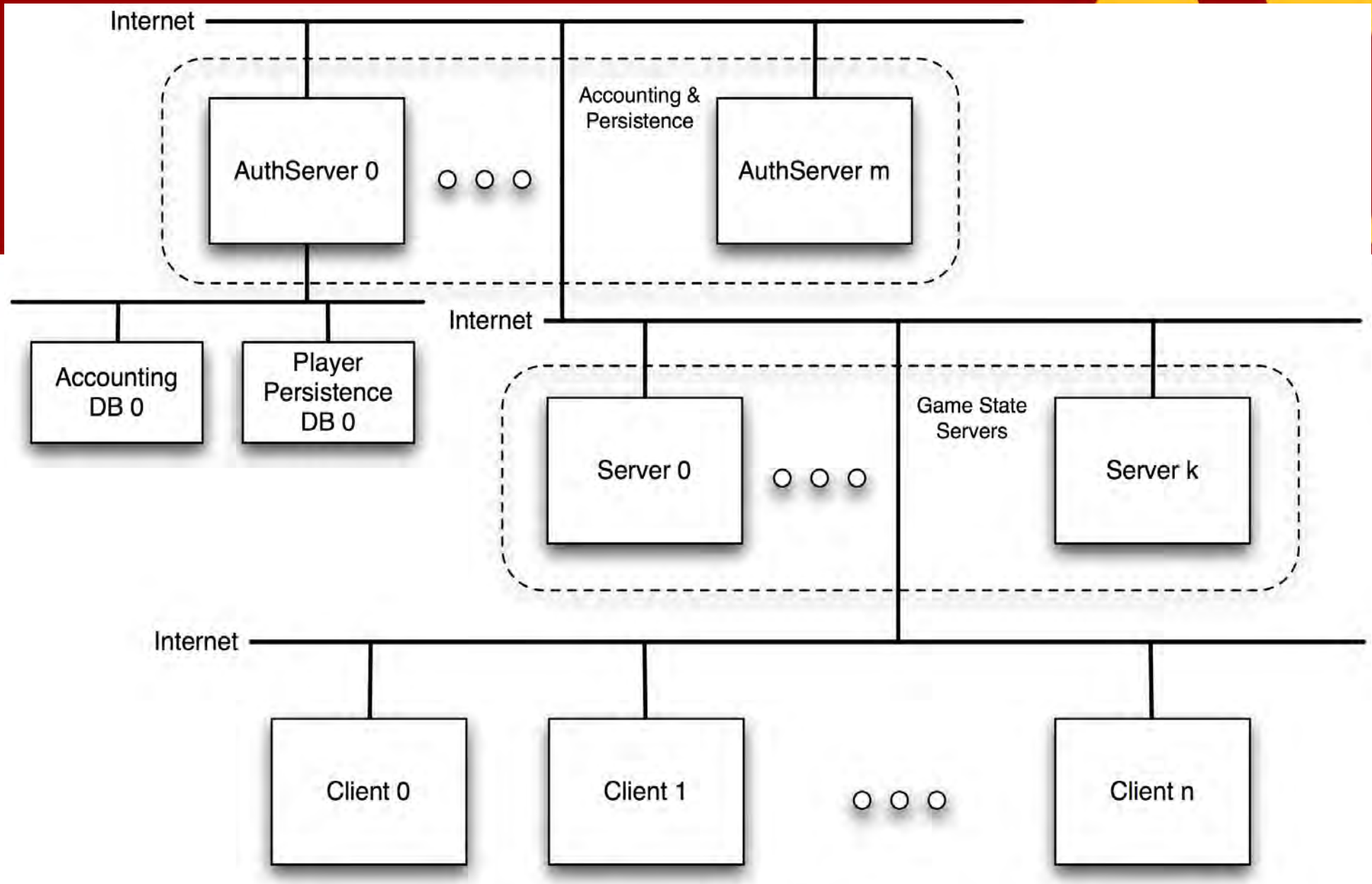
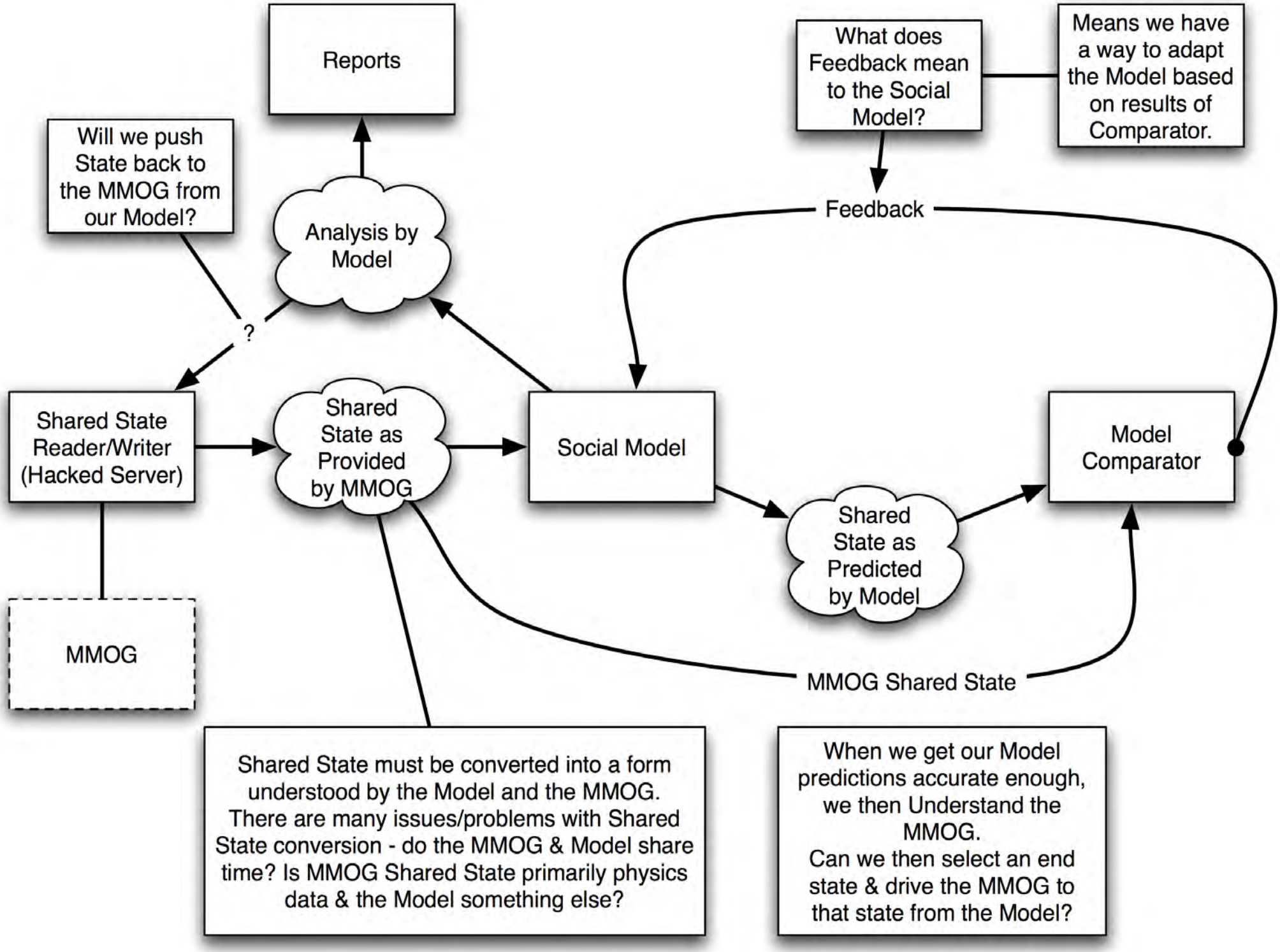



Figure 4-7 Multiplayer, full-out, scalable game architecture.


Reports
What does Feedback mean to the Social Model?
Means we have a way to adapt the Model based on results of Comparator.
Will we push State back to the MMOG from our Model?
Analysis by Model
Feedback
?
Shared State Reader/Writer (Hacked Server)
Shared State as Provided by MMOG
Social Model
Model Comparator
Shared State as Predicted by Model
MMOG
MMOG Shared State
Shared State must be converted into a form understood by the Model and the MMOG. There are many issues/problems with Shared State conversion - do the MMOG & Model share time? Is MMOG Shared State primarily physics data & the Model something else?
When we get our Model predictions accurate enough, we then Understand the MMOG.
Can we then select an end state & drive the MMOG to that state from the Model?

USC Viterbi
School of Engineering

# Development Plan for A DHS Massively Multiplayer Online Game (MMOG)

# A proposal ...

The Department of Homeland Security (DHS) is interested in the national STEM-learning-challenge of increasing the number of America's young entering career paths in science, technology, engineering and mathematics.

An opportunity to reverse that decline is to use the medium of the interactive videogame to familiarize Americans with the technological challenges faced by the Department of Homeland Security.

# A proposal ...

The idea is to build an entertaining game in a fashion similar to that of America's Army that acts as a strategic communication between the young and DHS.

We propose to examine the massively, multiplayer online game space as that is the fastest growing segment of the current videogame industry.

# Planning the DHS MMOG

We propose to develop a plan and an initial game design for developing a DHS-specific MMOG.

This will be an entertainment game that utilizes DHS-themed material to engage the mind of America's youth with respect to government service, and the underlying DHS technological issues.

# Planning the DHS MMOG

Players of this game will choose character roles, undergo appropriate training, and participate in DHS missions.

There will be win/lose states and characters will be persistent.

The proposed game would play across the commercial Internet, and the appropriate technologies and development paths will be identified.

A proposed budget for the full development of the game and its deployment will also be developed.

# Tasks

1. Game design development – we will develop a game treatment, a paper design, for the DHS-MMOG describing game play, and relevant game mechanics.
2. Game technology study & recommendation – we will enumerate the technologies required for the development and deployment of the DHS MMOG, including network infrastructure, user-generated content capabilities, model-embedding potentials, open source versus closed source, etc..

# Tasks

3. Testing & user community development plan – we will develop a plan for the deployment of a user-community web presence, and a plan for utilizing that web presence in conjunction with the developed game to ensure that our objective of STEM recruitment is accomplished.
4. Budget Plan – we will develop game development and deployment budgets for the proposed DHS MMOG.

# Timeline

We propose to begin this planning effort with the start of the new semester, January 2008, and conclude with a written plan, presentation and budget by the 31st of December 2008.

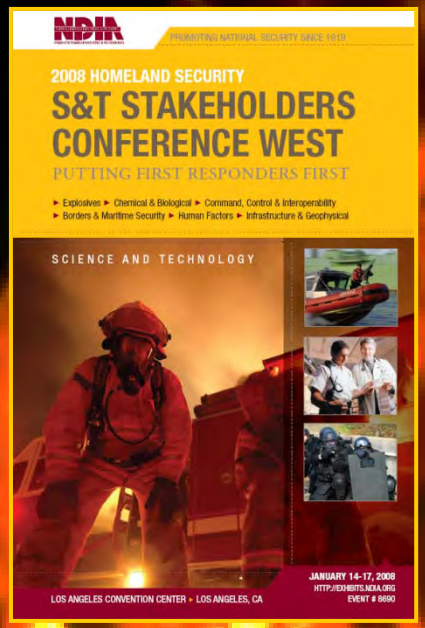
# Proposed Partners

- USC GamePipe Laboratory
- USC Interactive Media Program
- USC Center for Risk and Economic Analysis of Terrorism Events (CREATE)
- USC Integrated Media Systems Center
- Pacific Northwest National Laboratory (PNNL)
- Sandia National Laboratories
- Virtual Heroes

USC Viterbi
School of Engineering

# The USC GamePipe Laboratory

Michael Zyda, Director
Zyda@usc.edu
http://gamepipe.usc.edu




# SBIR Tutorial

**Elissa Sobolewski**
**SBIR Program Manager**
**Office of Innovation/HSARPA**
**Science and Technology Directorate**
**Department of Homeland Security**

***"Putting First Responders First"***

Homeland Security
Science & Technology

# Small Business Innovation Research Program (SBIR) Mission

Supporting scientific excellence and
technological innovation
through the investment of federal
research funds
in critical American priorities
to build a strong national economy…

one small business at a time.

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# SBIR Program Description

- Set-aside program for small business concerns to engage in federal R&D -- with potential for commercialization
- 2.5% of the extramural R&D Budget of an Executive Agency or Military Department

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# Why SBIR????

## Small Business Innovation Development Act of 1982

**Congress designated 4 major goals:**

- Stimulate technological innovation
- Use small business to meet federal R&D needs
- Foster and encourage participation by minorities and disadvantaged persons in technological innovation
- Increase private-sector commercialization innovations derived from federal R&D

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# 2000 Reauthorization

Major Provisions of Public Law 106-554; Signed 12/21/00

- Program Extension until 9/30/2008
- Output and Outcome Data
  - ✓ Public Database: **basic award information**
    - ➢ Tech-Net-- http://technet.sba.gov
  - ✓ Government Database: **program evaluation**
    - ➢ Phase II awardees -- e.g., new product sale revenues; other investment funding sources

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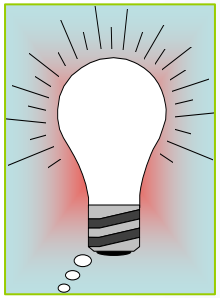
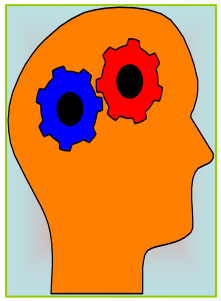
# SBIR – A Three Phase Program



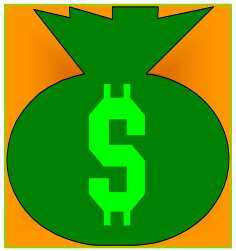
**PHASE I**

- **Feasibility Study**
- **$100K (in general) and 6 month effort**



**PHASE II**

- **Full Research/R&D**
- **$750K and 24 month effort**
- **Commercialization plan required**



**PHASE III**

- **Commercialization Stage**
- **Use of non-SBIR Funds**

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# SBIR Program: Eligibility Checkpoints

- Organized for-profit U.S. business
- 500 employees or fewer, including affiliates
- PI's primary employment must be with the small business concern at the time of award and for the duration of the project period
- At least 51% U.S.- owned by individuals and independently operated or at least 51% owned and controlled by another (one) for-profit business concern that is at least 51% owned and controlled by one or more individuals

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# SBIR Program Eligibility: Ownership and Control

Got questions?

- **Contact the SBA Size Specialists**
- **Request an eligibility determination**

http://www.sba.gov/size/indexcontacts.html

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# Performance of R&D Activities

"All research/R&D must be performed in its entirety in the U.S."

- Rare cases to conduct testing of specific patient populations outside U.S. is allowable
- Travel to scientific meeting in foreign country is allowable
- Foreign consultants/collaborators allowable, but must perform consulting in U.S.

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# Fee/Profit

## Up to 7% of total direct and F&A costs may be requested for fee

- Must be REQUESTED/JUSTIFIED in application/proposal
- Only SBC eligible; no contracts, consortium or other third party are eligible for fee
- Not direct or indirect cost

***DISCUSS WITH CONTRACTING OFFICE**

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# Agency SBIR Differences

**Read the Solicitation**

- **Number and Timing of Solicitations**
- **R&D Topic Areas -- (Broad vs. Focused)**
- **Dollar Amount of Award (Phase I and II)**
- **Proposal Preparation Instructions**
- **Financial details (e.g., Indirect Cost Rates, Gap Funding)**
- **Receipt Dates**
- **Proposal Review Process**
- **Proposal Success Rates**
- **Type of Award (Contract or Grant)**

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| | DOD | NASA | DOT | EPA | DOE | DHS | DOC | NSF | USDA | DoED | NIH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Award Type *Contract Grant* | C | C | C | C | G | C | C | G | G | G/C | G/C |
| Award Amount *Phase I* | 70K-100K[a] Options[c] | 70K SBIR 100K STTR | 100K | 70K | 100K 9 mos | 100K 150K[d] | 75k | 100K | 80K | 100K | 100k[b] |
| Award Amount *Phase II* | 750K | 600K | 720K | 225K[c] | 750K | 750K 1M[d] | 300k | 500K[c] | 325K | 750K | 750K[b] |
| Review Process | I | I | I | I | E | I | I | E | E | I | E |
| Research Topics | S | S | S | S | S | S | S | B | B | S | B |
| Gap Funding | Y | N | N | N | Y | N | N | Y | Y | N | Y |
| Communication | R | R | R | R | R | R | R | O | O | O | O |

C - Contract
I - Internal Review
S - Specific
R - Restricted

G - Grant
E - External Review
B - Broad
O - Open

[a] Varies among DOD subcomponents.
[b] Deviations permitted with justification
[c] Some agencies offer Ph II options
[d] DHS Domestic Nuclear Detection Office

***Agency Differences***
***ALWAYS CHECK***
***WITH AGENCIES***

# DHS… a single, integrated agency

- Directorates
  - Management
  - **Science and Technology (S&T)**
  - National Protection & Programs
- Offices
  - Policy
  - Health Affairs
  - Intelligence and Analysis
  - Operations Coordination
  - **Domestic Nuclear Detection Office (DNDO)**
  - Federal Law Enforcement Training Center
- Major Component Agencies
  - Transportation Security Administration
  - U.S. Customs and Border Protection
  - U.S. Citizenship and Immigration Services
  - U.S. Immigration and Customs Enforcement
  - U.S. Secret Service
  - Federal Emergency Management Agency
  - U.S. Coast Guard

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Organization charts available at:
http://www.dhs.gov/xlibrary/assets/DHS_OrgChart.pdf

# DHS SBIR Program

- Two contributing organizations:
  - Science and Technology (S&T) Directorate
  - Domestic Nuclear Detection Office (DNDO)
    - Point of Contact: Dr. Austin Kuhn, austin.kuhn@dhs.gov

Remainder of presentation focuses on the S&T SBIR Program

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# FROM SCIENCE...SECURITY

## Explosives

## Chemical/Biological

## Command, Control, & Interoperability

## Borders/Maritime

## Human Factors

## Infrastructure/Geophysical

# FROM TECHNOLOGY...TRUST

# DHS S&T SBIR Strategy

- Engage all program managers (PMs) within the divisions of the S&T Directorate
- SBIR topics are:
  - Authored by DHS PMs based on DHS need
  - Medium width (not point solutions, not open topics) and have near-term commercialization potential
- Award multiple Phase I and Phase II projects
- Reduce or eliminate the gap between Phase I and Phase II
- Provide active involvement to reach Phase III
  - Encourage teaming and collaboration
  - Involve ultimate user

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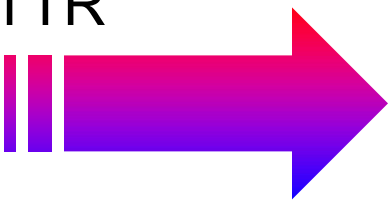
# SBIR/STTR Participating Agencies ($2.3B FY 07)

- DOD SBIR/STTR
- HHS SBIR/STTR
- NASA SBIR/STTR
- DOE SBIR/STTR
- NSF SBIR/STTR
- **DHS SBIR**
- USDA SBIR
- DOC SBIR
- ED SBIR
- EPA SBIR
- DOT SBIR



**FY04 SBIR $19.6M**

**FY05 SBIR $23.0M**

**FY06 SBIR $31.8M**
**FY06 STTR $ 3.2M**

**FY07 SBIR $25.2M**
**S&T $18.4M**
**DNDO $ 6.8M**

**FY08 SBIR**
**S&T ~$12.5M**

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# DHS S&T SBIR – A Three-Phase Program

| | SBIR |
|---|---|
| Phase I:<br>Scientific and Technical Feasibility | *NTE* 6 months*<br>$100K<br>(33% may be outsourced) |
| Phase II:<br>Concept Development | *NTE 24 months*<br>$750K<br>(50% may be outsourced) |
| Phase III:<br>Product Development | Private or non-SBIR government funding |

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* Not To Exceed

# DHS S&T SBIR Program

- Two solicitations per year
  - Posted in Federal Business Opportunities at www.fedbizopps.gov and on www.sbir.dhs.gov
  - 15-day pre-solicitation posting and 45-day proposal period
  - Historically, approximately six – ten topics per solicitation

- Awards
  - Multiple contract awards based on evaluation, funds available, and programmatic considerations
  - Typically three Phase I awards per topic area
  - Historically, 1/3 of the Phase I awards go on to Phase II

- Electronic Processing
  - Proposals submitted/evaluated via web site at www.sbir.dhs.gov
  - Electronic notification of proposal receipt/results
  - Submission of reports via web site at www.sbir.dhs.gov

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# DHS S&T SBIR Evaluation Criteria

- The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution

- The qualifications of the proposed principal investigators, supporting staff, and consultants
  - Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results

- The potential for commercial (government or private sector) application and the benefits expected to accrue from this commercialization

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# DHS S&T SBIR Evaluation Process

- Proposals processed and made available to appropriate DHS technical program manager for evaluation and recommendation
  - PM may seek technical advice from qualified Federal Government employees and/or non-Federal Government employees

- Each proposal evaluated, on a competition basis, on its merit and relevance to the specific SBIR topic area, rather than against other proposals

- Evaluators use an adjectival rating system:
  - Excellent — Strongly Recommended for Funding
  - Very good — Recommended for Funding
  - Good — Fund Availability
  - Fair — Fund Availability
  - Unacceptable — Not Recommended for Funding

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# DHS SBIR Statistics

| | FY04 $19M | | FY05 $23M | | FY06 $35M (includes STTR) | | FY07 $25.2M | |
|---|---|---|---|---|---|---|---|---|
| Solicitation | 4.1 | 4.2 | 5.1 | 5.2 | 6.1 | 6.2 | 7.1 | 7.2 |
| Number of Topics | 8 | 6 | 6 | 6 | 10 | 6 | 10 | 7 |
| 1,740 Phase I Submissions | 368 | 157 | 215 | 208 | 194 | 178 | 236 | 184 |
| 293 Phase I Awards | 66 | 31 | 32 | 30 | 45 | 28 | 38 | 23 |
| 81 Phase II Awards | 21 | 13 | 11 | 17 | 19 | TBD | | |
| Cost Match | 2 | 1 | | | | | | |
| Funding Provided to Other Agency Phase II Awards | 3 | | 1 | | 3 | | 1 | |
| Phase III Awards | 2 | | 2 | | | | | |

**Award Average**
Phase I: 17 %
Phase II: 40 %

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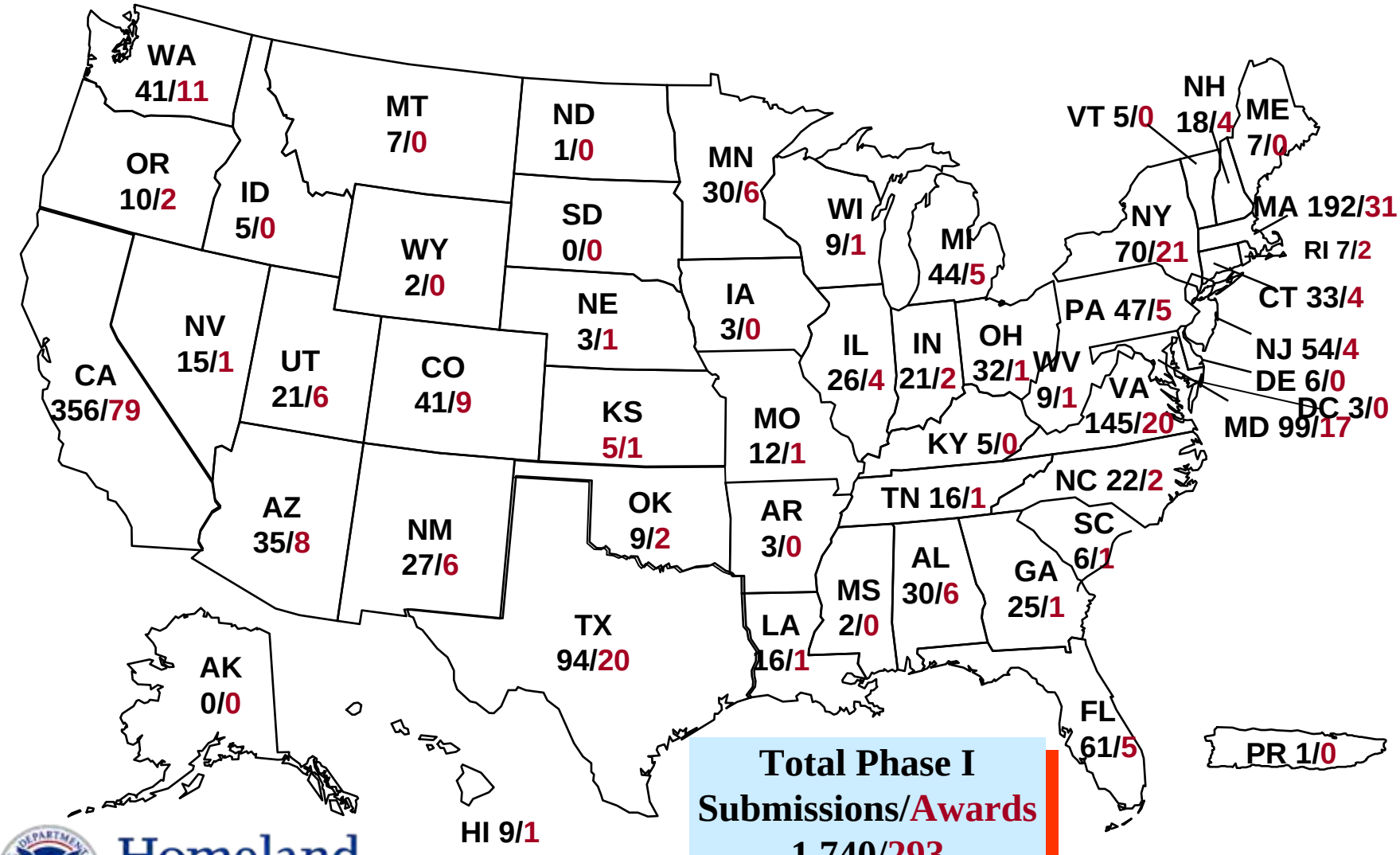
# DHS SBIR Phase I

## *Data from 8 Competitions through FY07.2**




**Total Phase I Submissions/Awards**
**1,740/293**

* Includes STTR data

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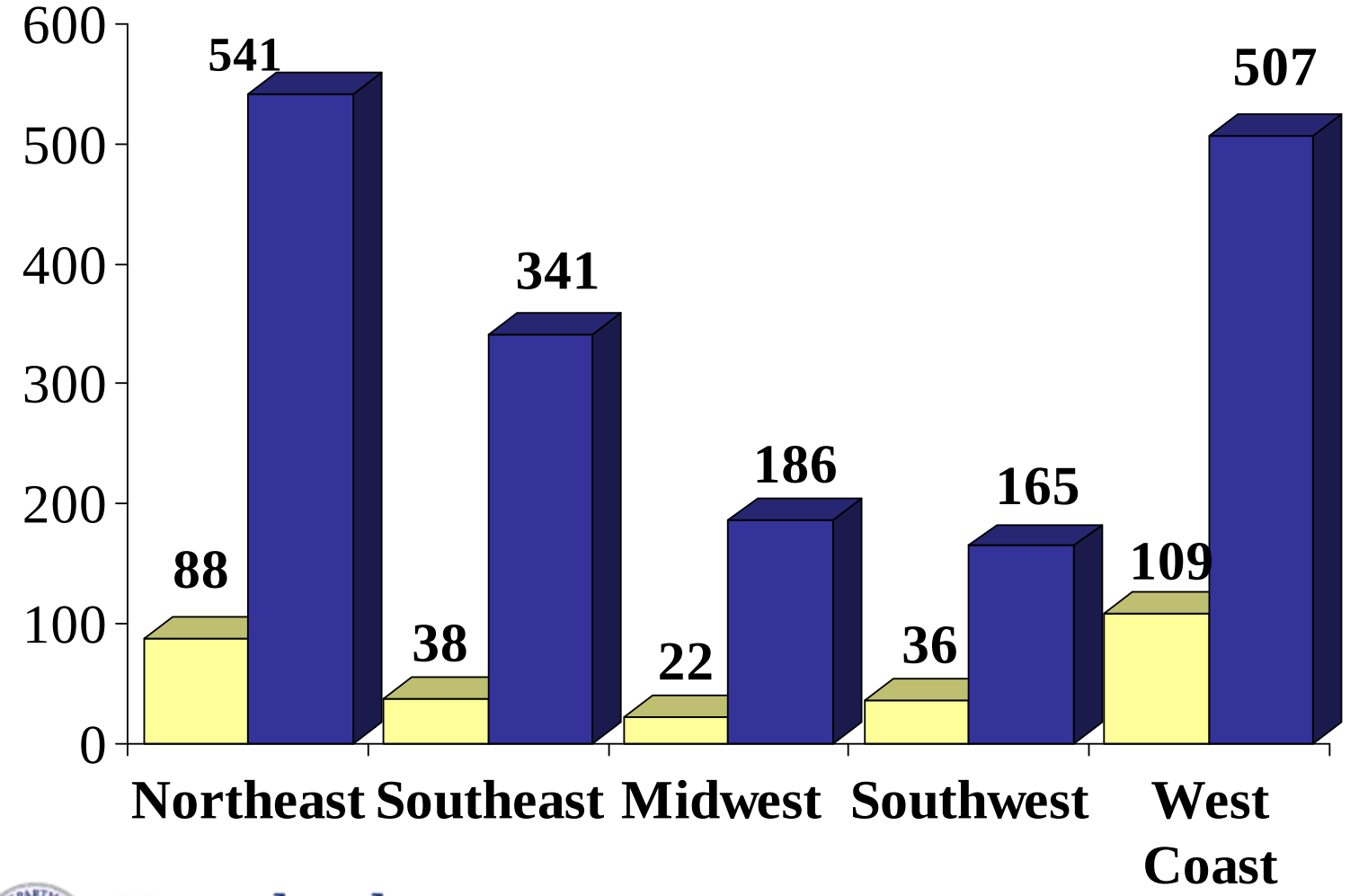
# DHS SBIR Phase 1 Awards Versus Submissions by U.S. Regions*

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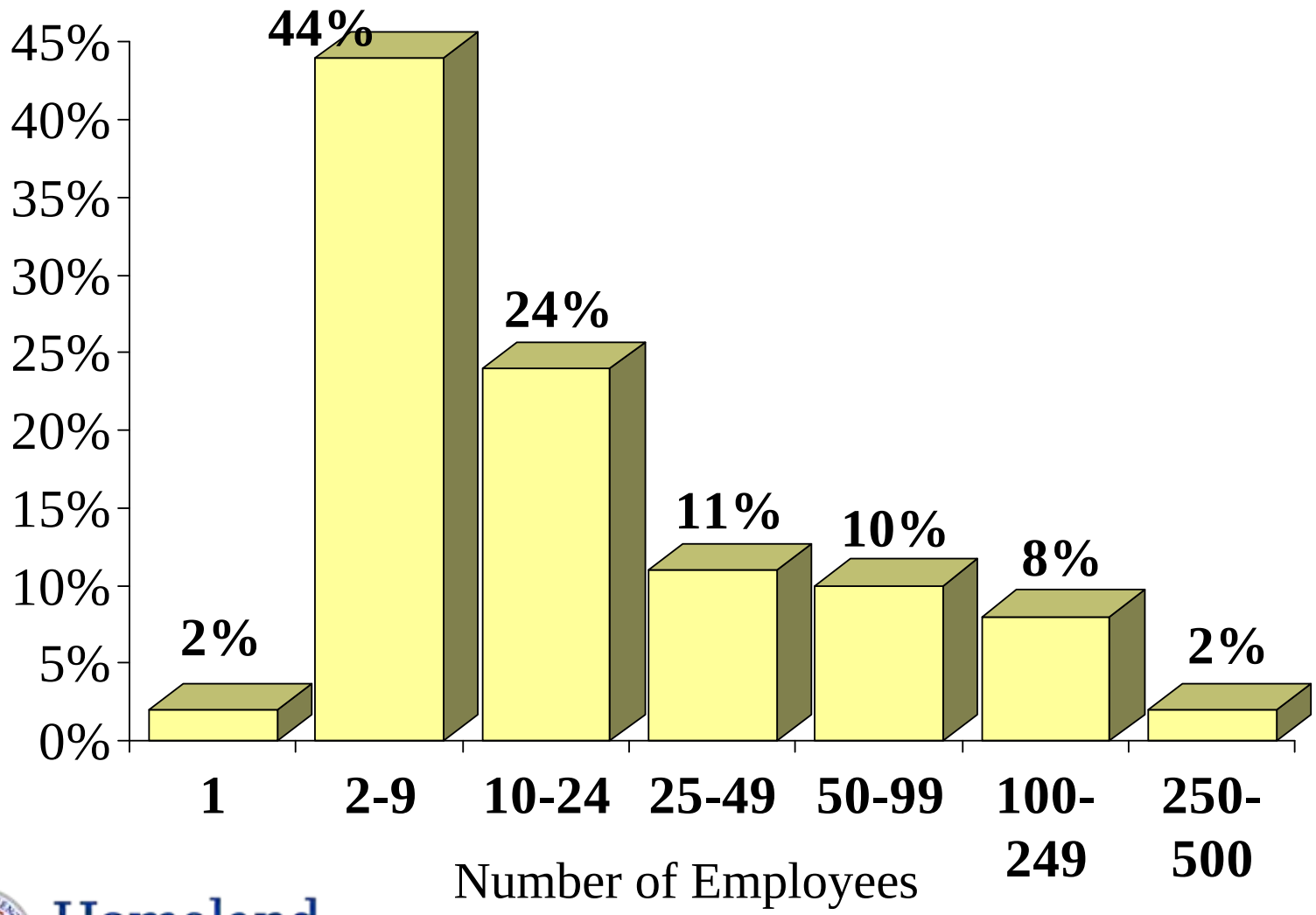
* Includes STTR data

# Who Participates in the DHS SBIR Program?

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# Jump Start to Phase II

- Only for meritorious Phase I projects with clear potential for Phase II
- Invitation (at the discretion of DHS PM) for Phase II proposal submission before the completion of Phase I
  - Invitation no earlier than 2/3 of period of performance (i.e., not earlier than month 4)
- Invitation basis:
  - Performance toward Phase I technical objectives
  - Monthly and/or final reports
  - Site visits
  - Plans for Phase II
- Phase II proposals evaluated and awarded incrementally

*Decreases/eliminates funding gap between phases and accelerates development of technology*

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# Jump Start Statistics

| | FY04 $19M | | FY05 $23M | | FY06 $35M (incl. STTR) | |
|---|---|---|---|---|---|---|
| Solicitation | 4.1 | 4.2 | 5.1 | 5.2 | 6.1 | 6.2 |
| Invited Phase IIs | 30 | 18 | 15 | 19 | 29 | 8 |
| Selected Phase IIs | 21 | 13 | 11 | 17 | 19 | TBD |
| Pre-Contract Approval | 5 | 5 | | | | |

**Jump Start Phase II Award Average**
73 %

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# Cost Match

- Allows small businesses to seek additional funding for Phase II projects from non-SBIR sources
- Minimum of $100,000 to maximum of $500,000 of outside funding
- Matched by DHS SBIR up to $250,000 in a 1:2 ratio
- Example: $500,000 of outside funding may generate an additional $250,000
  - DHS funding = $750,000 (Phase II funding) + $250,000 (matched funds)
  - Outside funding = $500,000
  - Total project funding = $1,500,000
- Additional funds require additional scope – need to either add R&D on SBIR contract or other development and commercialization activities (or some of both)
- Cost match is a motivator for, and an indicator of, commercial potential

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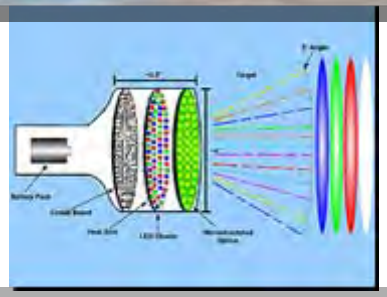
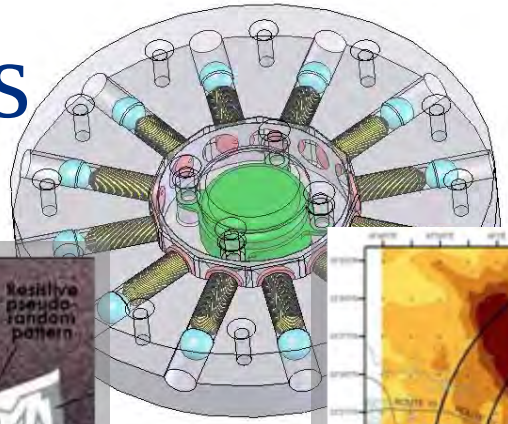
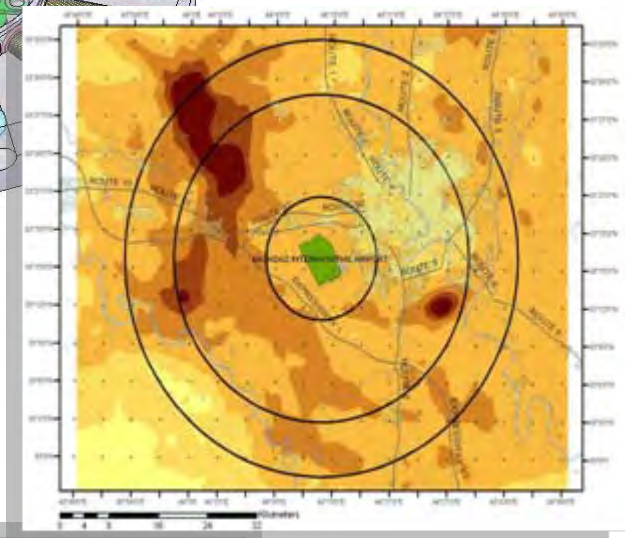
# DHS SBIR Projects







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# FY08 SBIR Schedule

- 08.1
  - Pre-solicitation posted: December 3, 2007
  - Solicitation posted: December 19, 2007
  - Proposals accepted: December 19, 2007 – February 4, 2008
  - Contracts awarded: ~April/May 2008

- 08.2 (Tentative)
  - Pre-solicitation posted: ~ April 2008
  - Proposals accepted: pre-solicitation date + 15 days
  - Proposals accepted: 45 days from solicitation date
  - Contracts awarded: ~ September 2008

Solicitations posted on:
www.fedbizopps.gov
and
www.sbir.dhs.gov

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# DHS SBIR S&T FY08.1 Topics

| | |
|---|---|
| H-SB008.1-001 | Assess Ability to Use Eye Tracking and Pupil Dilation to Determine Intent to Deceive |
| H-SB008.1-002 | Miniature Chem/Bio/Explosive Sensors |
| H-SB008.1-003 | Mapping of Long-Term Threats, Vulnerabilities, and Impacts |
| H-SB008.1-004 | Trace Explosives Sampling for Vehicle Borne Improvised Explosives Device (VBIED) |
| H-SB008.1-005 | Smart Sensor System |

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Address https://www.sbir.dhs.gov/in

http://www.sbir.dhs.gov

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SBIR PROGRAM

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*DHS SBIR has opened its 8.1 Solicitation on Wednesday, December 19, 2007*

## Department of Homeland Security Science & Technol
## SBIR/STTR Program

### *SBIR Program:*

The Department of Homeland Security (DHS), Homeland Security Advanced Research Projects Agency (HSARPA) launched the Small Business Innovation Research (SBIR) program in December 2003. Today, HSARPA administers the DHS SBIR Program for DHS's Science and Technology (S&T) Directorate and the Domestic Nuclear Detection Office (DNDO). Our goal is to increase the participation of innovative and creative small businesses in Federal Research/Research and Development (R/R&D) programs and challenge industry to bring innovative homeland security solutions to reality.

All Federal agencies with an annual extramural R&D budget exceeding $100M are required to participate in the SBIR Program. Each fiscal year not less than 2.5 percent of the annual extramural budget is reserved for awards to small businesses for R/R&D through a three-phase process.

**Safety Act**

**Other Funding Opportunities**

**Collaboration Opportunities**

**Topic Recommendations**

# Useful Web Sites and DHS S&T SBIR Points of Contact

**Useful Web Sites**

- www.sbir.dhs.gov
- www.hsarpabaa.com
- www.dhs.gov
- www.fedbizopps.gov
- www.sbir.gov


Vincent (Vinny) Schaper
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Jonetta Fantroy
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## Science and Technology

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